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EDITED BY

JAMES R. ANGELL, UNIVERSITY OF CHICAGO
HOWARD C. WARREN, PRINCETON UNIVERSITY (*Index*)
JOHN B. WATSON, JOHNS HOPKINS UNIVERSITY (*Review*)
ARTHUR H. PEIRCE, SMITH COLLEGE (*Bulletin*)

Tests for Practical Mental Classification

By

William Healy, M.D.,
Director of the Chicago Juvenile Psychopathic Institute

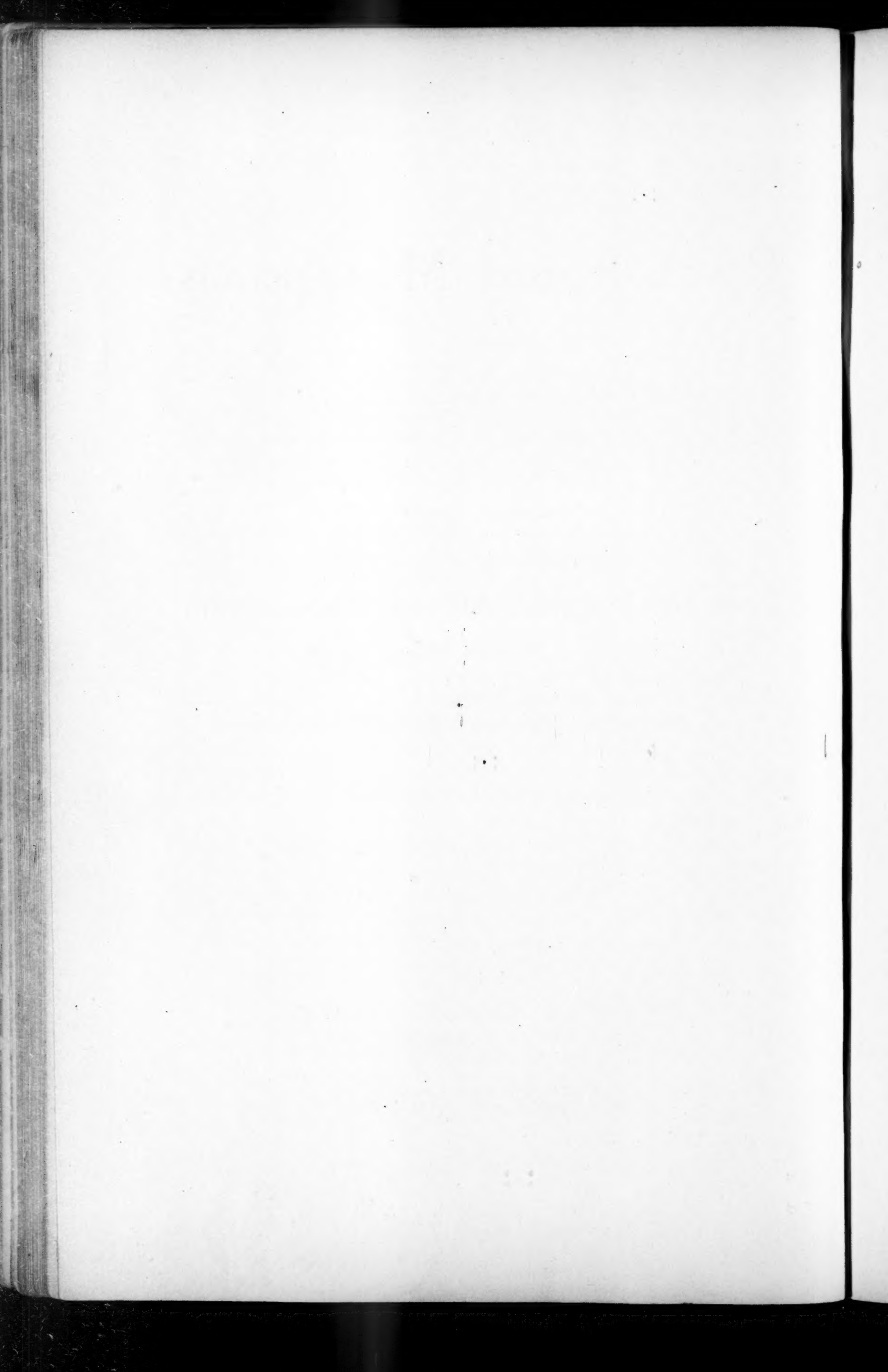
and

Grace Maxwell Fernald, Ph.D.
Formerly Psychologist of the Institute

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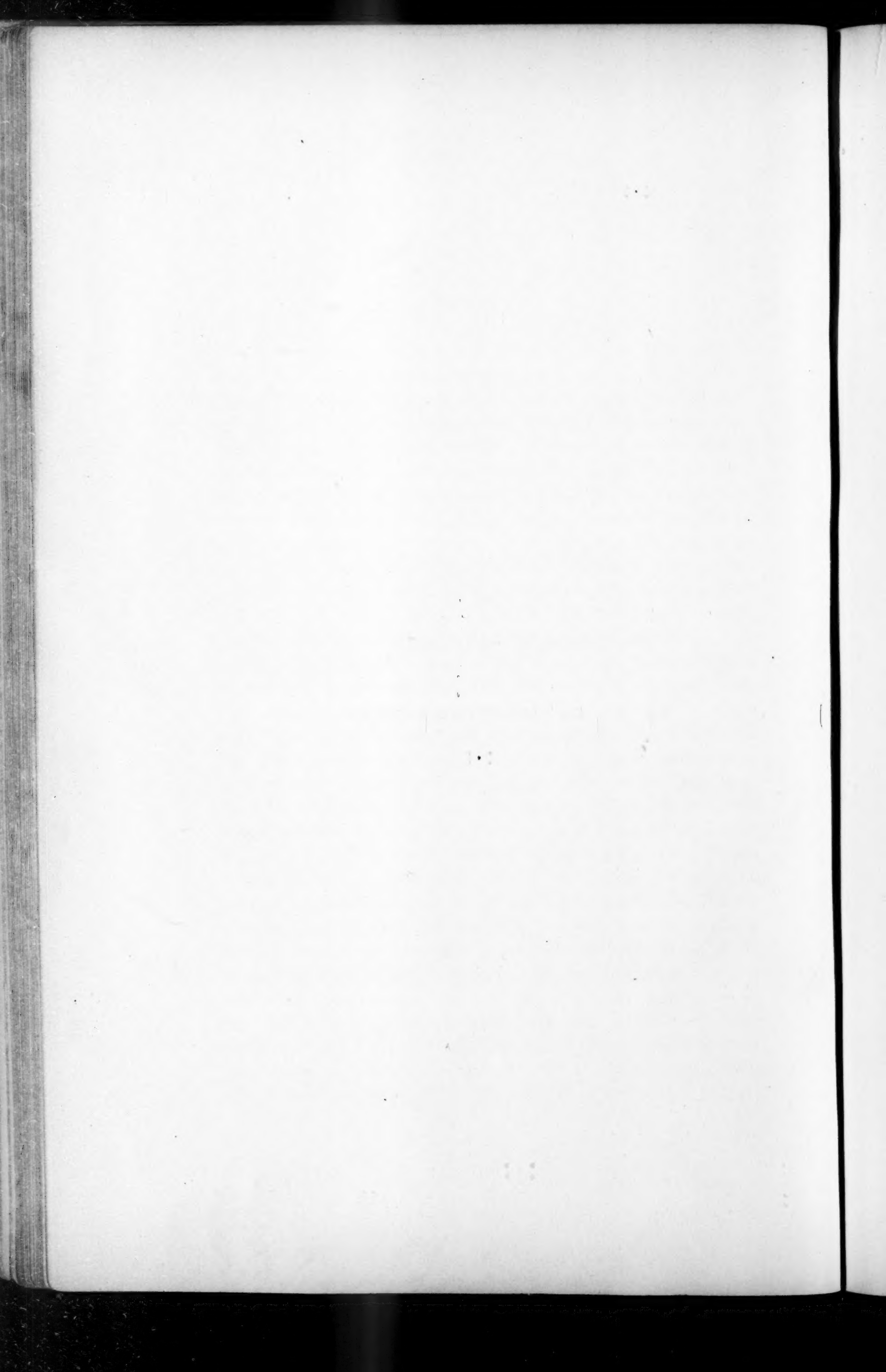


APPRECIATIVELY DEDICATED

TO

MRS. W. F. DUMMER

WHO HAS MADE THIS WORK POSSIBLE



PREFACE

The work of the Juvenile Psychopathic Institute of Chicago is centered on the highly important problem of causative factors of the criminalistic career. For many reasons the study of the young repeated offender is to be regarded as containing much promise. In the first place, statistics have amply proven him to be the future criminal—lacking American figures on this point we may cite Matz, who states that among the entire prison population of the province of Pommern seventy per cent have received their first punishment during their minority and that of those repeatedly sentenced, by far the greatest number have received their first conviction by the time they were seventeen years old. The factors then which make for criminality are nearly always already present before the end of adolescence. In the second place, the young recidivist is definitely regarded as a problem by parents, teachers, and officers, who frequently welcome any light which may be thrown on the case. At this period in a criminalistic career it is easiest to get cooperation from parents and families in the study of the individual. Sometimes this is of the utmost importance, as when conditions of environment, heredity and more particularly of developmental history, which have great bearing on the case, are revealed. Thirdly, the individual during childhood or early youth is usually at a much better age for the ascertainment of mental qualities than at a later and less naive period. Fourthly, the study of the individual has a much greater chance of being valuable at this age, when remedial measures will find greater mental and moral flexibility, than at any later period in life.

The amount of light that may be thrown upon these personal problems, both as regards the welfare of the individual and the protection of society, can only be shown, of course, by case studies. Suffice it now to say that a glance at the

results of thorough-going studies will demonstrate their absolute necessity if the right thing is to be done at the right time for the heading off of a criminalistic career.

We of the Juvenile Psychopathic Institute have been most fortunate in our psychologist friends. At the inception of our effort the policies of our psychological work were shaped largely in accord with the advice of men who were in the best position to know what should be done, and during the progress of the last two years in the building up of our set of tests, we have had much occasion to feel grateful for help received in many ways in the shape of suggestions and encouragements and criticisms. It is hopeless to attempt to specify proportions and points of help received. Messrs. Angell, O'Shea, Dearborn, Whipple, B. T. Baldwin, Sidis, Sanford, Thorndike, Goddard, Sharp, Woodworth, Muensterberg, MacMillan, Freeman, Jastrow, W. E. Fernald, Bruner, Huey and J. W. Hayes have all been constructively helpful. To them the director of this Institute wishes to express his grateful acknowledgement. To Professor Angell we are deeply indebted for assistance of various kinds, which has been given ever since the earliest working plans of the Institute were under consideration.

After the Institute had been established for a few months Dr. Grace M. Fernald came in as psychologist and was with us for a year. To her is due much praise for patient effort in our gradual development of the tests as well as for the special points which are credited to her in the text. Miss Clara Schmitt at one time voluntarily gave much help. The present psychologist of the Institute is Dr. Mary H. S. Hayes. Her work has been most helpful towards perfecting methods of recording and scoring of tests.

The director of the Institute assumes entire responsibility for the text of this monograph.

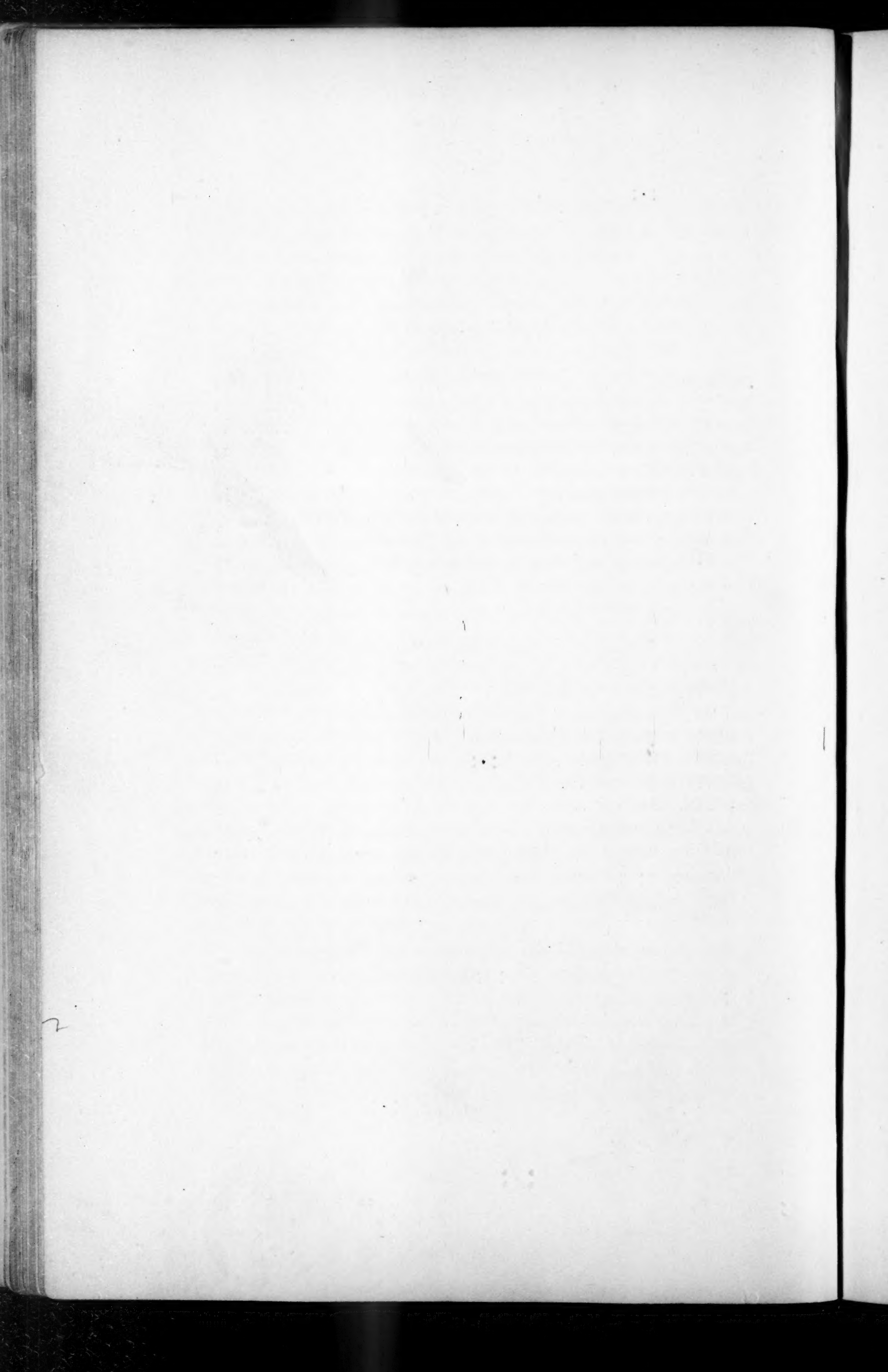
January, 1911.

W. H.

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TESTS FOR USE IN PRACTICAL MENTAL CLASSIFICATION

INTRODUCTION

Diagnosis of mental capabilities and adaptabilities as far as this might be practically possible, was seen at the outset of the work of the Juvenile Psychopathic Institute to be one of the main desiderata in our study of individuals who are young members of the criminalistic class or who are otherwise repeatedly delinquent.

It appears perfectly plain to any one who thoughtfully views the general criminalistic situation and especially the procedure of courts which deal with offenders who are presumably more or less in the formative period, that the agencies intended to produce the desired reform are set in operation without any careful ascertainment of the actual needs of the individual as such. In other words, treatment is definitely undertaken without diagnosis. The most cursory inspection shows that many cases appear in our courts presenting extremely difficult problems. This fact, together with observation of the failures of institutional treatment, due frequently, as many institutional men say, to improper classification and disposal of the offender, is leading many people who are acquainted with first hand facts to the conclusion that, perhaps, one of the greatest causes of the lack of success in our handling of criminals has been our neglect of the study of their actual mental conditions, needs and adaptabilities. Particularly does it seem that both they and society could profit, if carefully adapted regenerative or protective measures might be undertaken at the age when habits and character are being set. As for ourselves, it has been borne in upon us that the great call is for some practical methods of accurately determining what really may best be done for this or that individ-

ual offender in order that society may cease to suffer from his or her delinquencies. Note, not what ought to be done *to* them but what ought to be done *for* them. The recognition that the protection of society lies in the application of this formula and that the failure of the past in the matter is largely due to unscientifically applied retributions and repressions is the key note of the new criminology.

There are, of course, a number of points of view from which this whole problem of the peculiarities and possibilities of the repeatedly delinquent individual may be approached—sociological, medical and psychological. We have outlined them elsewhere.¹ Even in the psychological field there are standpoints, especially of abnormal psychology, other than that which will be presented in this paper. However, we have been convinced that in order to do effective justice to the total situation involved in any given case, whether in court or not, there certainly must be in every instance an estimation for practical purposes and, of course, by practicable methods of (a) mental ability independent, as much as possible, of the results of formal education; (b) the extent and result of formal education; (c) the preponderating opportunities and interests, in the life of the individual [or lack of what might be rationally expected to be normal opportunities and interests], as shown by some study of mental content. It is with these three points that we are especially concerned in this paper. We must here, once for all, insistently disclaim that we think that under these heads one can find out, even in the majority of cases, all that is best to be done for the individual. We have seen many instances where the essential trouble was discovered only by inquiry instituted from an entirely different point of view. It is clear, at all events, that these three considerations, in the general survey of the individual and the factors in his development, must never be disregarded.

The desirability of psychological work in connection with courts which have to do with the disposition of criminals and

¹ Journal of Amer. Institute of Criminal Law and Criminology, Vol. 1, No. 1, May, 1910. Also 'A System of Recording Data,' Bulletin No. 2 of the same Institute.

delinquents, especially juvenile courts, is perhaps hardly necessary to emphasize to readers of this paper. But still it may be worth mentioning that the judge with his slender opportunities for observation and his lack of results of carefully conducted examinations is often in a poor position to do the best that could be done. We know too much about mental defectives who have the gift of language, appearing bright and with good enough presence to readily pass muster in court, we know too much of defectives who can do well under the prescribed conditions of institutional life, to believe that without competent psychological examination differentiation can be safely made between those whom it is wise for society to allow out on probation and those who in the interests of social protection should have proper institutional or other guardianship.

After nearly two years of continuous daily work in our Institute, which has been generously endowed and which has received a splendid amount of assistance from able psychologists, to whom grateful acknowledgement has already been made, we find ourselves using methods and a set of tests which we have for the most part ourselves developed. On account of their practical nature and the demand which exists for them, the time for publication seems ripe, *but it is to be distinctly understood that we ourselves still regard our tests and methods as strictly tentative.* We have tried out and discarded a good many tests which have been offered, or which we have devised, and it may be that it will prove desirable to eliminate some of the present series—we already know them to be of unequal value—or to add others. However that may be, our set has been developed as the outcome of careful, practical work. It embodies the results of repeated conferences with various psychologists who have been willing to give their attention to the needs of this bit of semi-public work in which we are engaged.

The wisdom of developing our tests along lines befitting our eminently practical purposes has been well proven. The early advice of a number of eminent American psychologists to avoid mechanical laboratory apparatus accorded with our

first survey of the necessities and ends of the work. We needed tests, not for the purpose of analyzing out or measuring the simplest mental elements or small differences, but rather for estimating the quality and quantity of the more general complex mental characteristics—particularly such as are involved in the intellectual and moral judgments, the performance of occupational tasks and other reactions of actual daily life; such mental characteristics, in a word, as might be suspected of being correlated with variations from the moral standards of society. One point has had to be carefully guarded all along—it is most necessary in such work with our cosmopolitan population to eliminate the language factor as much as possible. In predicting the possible development of an individual under various conditions it is most desirable to ascertain the mental ability quite apart from the individual's experience in formal training in our language, or indeed in any language. It often becomes necessary to classify mentally a subject who has had no education in English-speaking schools, or, indeed, who has had but little schooling of any kind. On one occasion we found ourselves able to demonstrate satisfactorily that a gypsy boy of 15, quite innocent of schooling and knowledge of the 'three R's', had at least fair, if not good, native ability. And repeatedly a number of our tests have proven most serviceable in mentally classifying young deaf and dumb children. Altogether we know that by the use of these tests and inquiries most efficient aid is obtained in the making of diagnoses which lead to recommendations for the handling of the individual, but, no doubt, we shall ourselves in the future find improvements. In the meantime we specifically invite suggestions and criticisms to the end that better work may be done all along the line on this vastly important subject.

Our initial investigation into this field showed no set of mental tests at all adequate to give the desired information about the capabilities of delinquents. We found that the average age of the repeated offender to be studied was 15 years, while we must occasionally see children as young as 8 years old, and that sometimes we should also see young adults.

These individuals range in mental capacity all the way from imbecility to those who seem considerably to excel the ordinary person of their age in ability and information. We have had to evolve practical methods for estimating this entire array of abilities except for those of children under 10 and for the definitely feeble-minded. In working with these two latter classes we have used the Binet classification, especially for the diagnosis of the institutional type of feeble-minded. Like other workers in this field, we have found this system extremely valuable, but still presenting a number of imperfections. It helps very little where the language factor is a barrier, either on account of foreign parentage or insufficient schooling, and with uneducated deaf and dumb children. Of the tests which form our own set, a few have been well worked up by other investigators before us. Proper acknowledgment will be made in each instance.

Our tendency has steadily been towards making our use of tests and inquiries more and more thorough. Experience teaches us that a cursory examination may lead to unsound conclusions which in turn may be made the basis of thoroughly unadapted attempts at betterment. At the same time, perforce of circumstances, we have been obliged, as every other worker will be obliged, to keep within practicable working conditions. This means that while one may be able to spend the equivalent of an entire day's work on one case, or occasionally the equivalent of two or three days' work, a longer time will probably be found almost everywhere impracticable. We are by no means sure that for the first diagnosis it will be found necessary. Almost any reasonable expenditure of effort would be economical, of course, to head off a criminalistic career, but secondary to the original estimation of the individual and his needs there should be, whenever possible, follow-up work in the shape of evaluation of changing phases of the individual's development and of the results of ameliorative measures, which may have been instituted. We have striven always to make tests, not for the test's sake, but for the sake of knowing the individual.

Since one of our tests has only recently been evolved, and

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some have lately been modified, and in still others new methods of scoring have been devised, while, on the other hand, certain ones have been long used by us as well as by others before us, it follows that our knowledge of the norms for the different tests is exceedingly unequal. However, we know that no one of them is too difficult and that none of them involves too much time in getting positive results. We are able to give the working limitations for even the newest of them, but the development of actual norms is a matter for the future and will be a separate contribution. The critical findings of other investigators will, we hope, be of great value. As it stands now, what the set of tests and inquiries offers is an opportunity for making a practical, work-a-day classification and estimate of capabilities that shall tend to throw valuable light on what ought to be done with those individuals who are distinct problems from a normal standpoint, and this whether the case is to be adjudicated by the officers of the law or handled by family guardians.

Concerning the possibility of getting hold of the individual in the right way for ascertaining the scientific truths desirable, we ought to say in explanation and for the encouragement of those who contemplate anything like a similar endeavor, that we have been overjoyed to find the heartiest cooperation both on the part of parents and of children. There were some doubts at the outset about possible disturbing emotional attitudes and interfering recalcitrancies, but we have found these untoward possibilities practically negligible.

We have discovered at least two phenomena that have worked greatly in our favor; the first is that the individual before his case is adjudicated in any way, either in court or out of it, is, in the vast majority of instances, peculiarly keen to show the full extent of his ability. On several occasions we had the experience of finding that the individual already committed, we will say to a reformatory, was a totally different being from one whose case was pending, or who was on probation and who had the possibilities and hopes and encouragements of the future before him. Then, second, we

also found that there seems to be a certain age, varying considerably in different individuals, but below which one can expect naïveté and a peculiarly frank attitude toward the world, even in some of the morally worst of the boys and girls, and beyond which age, as a rule, except by dint of much greater effort, one can not hope to develop the friendly relationships which are necessary for getting the scientific data. Below this age, whatever it may be, is the time of responsiveness, openness and usual truthfulness—prevarications then being often of such ingenuous character that they are readily recognizable—beyond that period is secretiveness, aloofness, the development of a definite attitude, it may be of grudge, toward the world; the individual has often built up a wall in front of himself that is hard to break down. A little experience on these points would demonstrate to many a criminologist where his work ought to begin.

It seems that nearly always the approach to the tests is much less self-conscious in young people than in adults, and this not altogether on account of the fact that they are constantly being asked for response to tests in school, for we have observed it in children who have been to school little or not at all. With the idea of invoking always as much interest as possible in our tests, we have ever had in mind the development of them in forms resembling games and puzzles, but really involving points much more open than puzzles to solution by use of simple reasoning ability. This has seemed highly successful, for it has been our frequent experience to have our subject want to do the things all over again. Another condition for achieving success must never be lost sight of, that is the presentation of a winning and encouraging attitude on the part of the investigator. Binet is right; if one wishes to get tests fairly used there must be constant encouragement and stimulus, even in the face of poor results, provided earnest effort has been made.

It is of considerable importance in most instances to have the school record of an individual in order to evaluate his present standing in regard to both information and the results of formal education. Naturally, the type of school an indi-

vidual has attended, whether or not his learning has been mostly in a foreign language, as is the case with some of our subjects born in this country, whether there has been much truancy or absence from other cause, the type of instruction in that particular school, the attitude of the teacher and the individual towards each other, the age at which schooling was begun and ended, the grade reached and whether that grade was the standard of the good school system, if retardation in school, what cause was assigned—all these are factors about which much can be frequently ascertained through the family, or the officer in charge, or directly from the teachers and principals.

The order in which the following tests are given may be varied according to the needs of the given situation, and particularly to the apparent interests evoked during the examination. We have arranged the set with the idea of grouping for expository purposes those tests which involve the same general forms of mental activity. To avoid fatigue and keep up interest we specifically advise against giving them in this logical order. Very frequently we find it necessary and advisable to divide them for different sittings and such division is made quite irrespective of any given grouping. To hold attention and interest seems quite the most essential condition. With these precautions we are seldom bothered by apparent fatigue, but, of course, one should be on the lookout for it. The only test which is intended to be given in a definite order is the one so specifically named, the introductory puzzle.

In common with other workers on mental tests, we insist on the necessity of our tests being made exactly as we prescribe and being used precisely as we stipulate, if anything like comparative results are aimed at. We have seen one of our designs, for instance, made by a competent laboratory mechanic, which would not conform to the apparently small requirement that certain parts be interchangeable. In consequence it failed entirely to bring out the very point that we found most valuable in estimating the ability of the subject. The entire set is quite inexpensive and is readily made

by any one with even a moderate amount of mechanical ingenuity. The description of each, it is hoped, will be, accurate and ample enough to enable any qualified investigator to make, or to have made, the test apparatus so precisely that every point of virtue may be thoroughly brought out.

Methods of scoring will be, of course, exceedingly important in connection with the use of each test. One of the valuable bits of work done in the Institute has been in estimating the kind of successes and kind of failures that have been made in the various tests. No single method of scoring could be regarded as generally valid and so in each case the treatment of the results obtained has had to be gradually worked out. The methods of scoring will be carefully specified in connection with a description of each test. The meaning of the separate points we hope will be gradually made clearer by further work. It may be that for some tests a system of percentage marks, calculated upon a basis of differently weighted details, will be found most desirable. But as a matter of fact, we think it will be clear to any one who applies the series, that even the rougher results obtainable from the use of the set as a whole, as it now stands with the method of scorings given, are most valuable from a practical standpoint. Reference to the chapter on classification will give some indication of practical findings.

For the purpose of showing the practicability of such a set of tests as ours, it seems desirable to give a concrete illustration of the working up of a case from this standpoint with the findings under each test. A subject who may be designated as Case 574 will be taken. This is a city boy, 15 years old and of American parentage. This particular individual has been selected not because he represents, except as to age, any sort of an average—it is as difficult a matter here as elsewhere to speak of an average individual—but simply because he represents in difficulty just such a problem as is handled every day by Juvenile Court officers. Physically he is rather under-developed and nourished, has a poorly developed chest and poor color. He has a frequently recurring habit spasm of the muscles of the eye lids. No trouble

with the special senses noted. Expression rather pleasant, manner polite, but he looks much worried and cries at times bitterly. The main points in his developmental history are that he had scarlet fever six years ago and was then very ill. Before that time he had an attack of chorea which lasted long and four or five years ago he had another prolonged attack. The twitching of his eyes began a couple of years ago. At ten years of age he began smoking; when with his street companions he frequently smoked from ten to fifteen cigarettes a day. The father died six years ago. He was a good man. The mother is a fairly intelligent and hard working woman who has moved away from the home which her husband left her, and where they had lived for fifteen years, because this boy was going with bad companions in the neighborhood. Last summer she put him with his brother out in the country for a couple of months and when there, the boy did well and did not smoke. No indication in any other way of other bad habits except occasionally playing with dice. The boy passed for eighth grade in the public school. He had left school some ten months prior to the time we saw him. The longest he has worked in any one place since then has been one week. In the meantime he has been going pretty steadily with the companions with whom he got into trouble before he left school. With them he has been engaged in some petty thievery. The mother and the officers have regarded this boy as a pretty serious problem, particularly because he seemed to be very smart and yet in spite of repeated promises to the judge and others, repeatedly got into trouble that would seem readily avoidable. As the mother put it, "What could be the matter with him that he should show so little sense. Had his nervous trouble affected his mind?"

The reader who looks over the results of the tests on this case should realize that the records are nearly all exceptionally good even for our fifteen year old subjects. From a psychological standpoint we decided that this boy was in ability considerably above the ordinary individual we see. Proportionately, his information was extremely narrow in range, particularly lacking was the interest in the things which healthy minded boys are usually most fond of.

DESCRIPTION OF TESTS

TEST I. INTRODUCTORY PICTURE FORM BOARD

The novel method of combining the idea of the test form board with the picture puzzle was developed because of the obvious interest there might be in such a test and because in the doing of it various elements of mental life are brought into play. This particular pattern has worked out successfully as an introductory test. It enables the investigator often to get a rough estimate of the subject's whereabouts in the scale of mental ability and it furnishes the latter with a task in which he is interested and in which, unless he falls low in the grade of the feeble-minded, he always has, at least, some measure of success. It is readily seen that the test brings out what the ordinary form board brings out, viz., perception of differences in form, powers of coordination in handling the pieces, the ability to learn by the experiences of trial and success and that beyond this, it may afford some gauge of the perception of the relationship of object to object, of parts to the whole—a most valuable faculty in life. If a boy observes, 'Oh, gee! that dog's caught a mouse', or 'There's a baby horse standing by its mother', one gets some impression of the subject's mentality. But if the attempt to put an animal's head in upside down is persistently made, that likewise bespeaks certain mental characteristics.

The design shows a certain number of pieces cut out on the natural lines of some of the objects in a picture together with four other pieces, one of which is irregular in shape, and three of which are cut on geometrical lines. Two of these last somewhat resemble each other, but are not interchangeable. The other geometrical piece is an equilateral triangle divided into two right angle triangles. This last was particularly to provide for a simple trial and error procedure, if the make-

up of the parent triangle was not at once recognized—as it usually is not. The plan is readily perceived from Figs. 1 and 3. This design as well as a number of our others, as will be apparent from the illustrations, may be made very readily and serviceably from selected, 3-ply, scroll-saw wood. For this introductory test a suitable picture, about 8 by 11 inches, from a child's picture book is carefully glued with strong glue to the wood. The pieces are then readily cut out with a scroll or bracket saw.

The method of procedure is worth noting here, not because this test is regarded in any way as one of the more exact of our series, but because it is representative of the general precautionary methods, which must in fairness be followed in all of them. To begin with, the subject is told in a general way what you are going to do with him in the examination. We often tell him we wish to see how good he is at doing things, how exact and how quick, and we often first show the stop-watch, nearly always an object of much interest, at least to boys. Then the picture with its empty spaces is put before him in good light. At its side, spread out right side up and well mixed, are placed the separate pieces. He is then told that here is an easy picture to put together and you want to see how quickly he can do it. Most of our twelve year old children succeed in doing this test in from one to three minutes.

Scoring: The variety and possible combination of mental elements which may be used in putting this picture form board together is so great that standardization for scoring, except in very rough ways, is undesirable. Time is of course taken and is registered from the moment the subject gets to work, but much more important than the time is the study of the method by which the task is done. Occasionally the degree of facility of muscular coordination is worth noting. By far the commonest difficulty is in correct placing of the two right angle triangles in the parent equilateral triangle. The most frequent error is that shown in Fig. 2. The enumeration of the points for scoring, with their respectively designated numbers is as follows: (See above.)

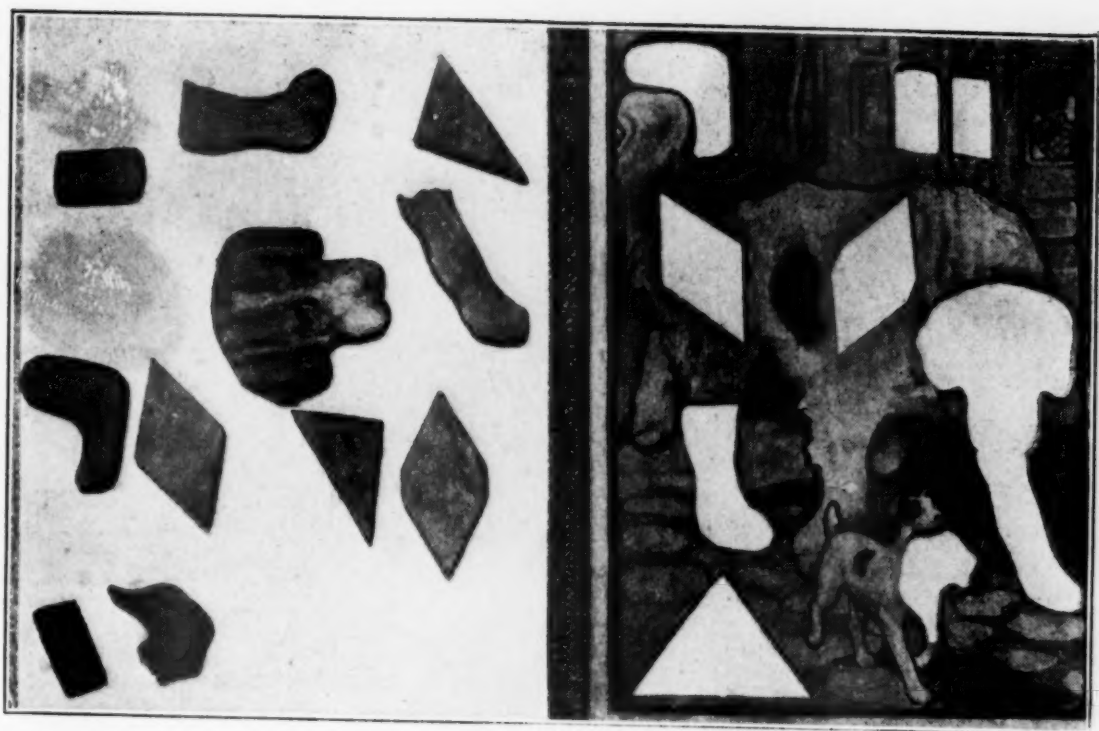


FIG. 1

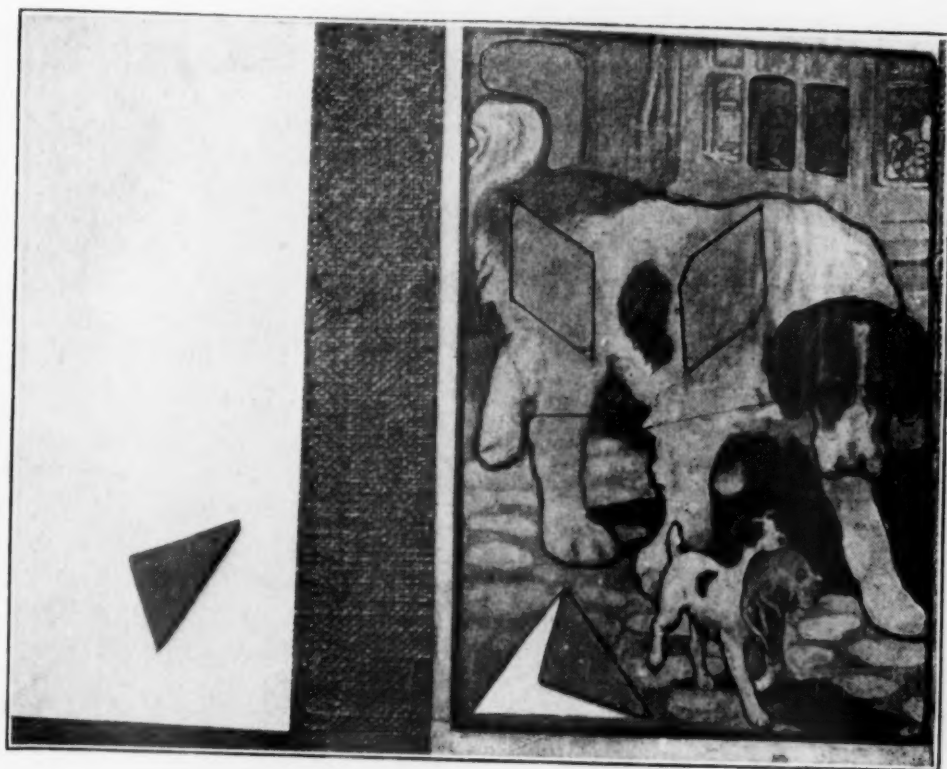


FIG. 2

110

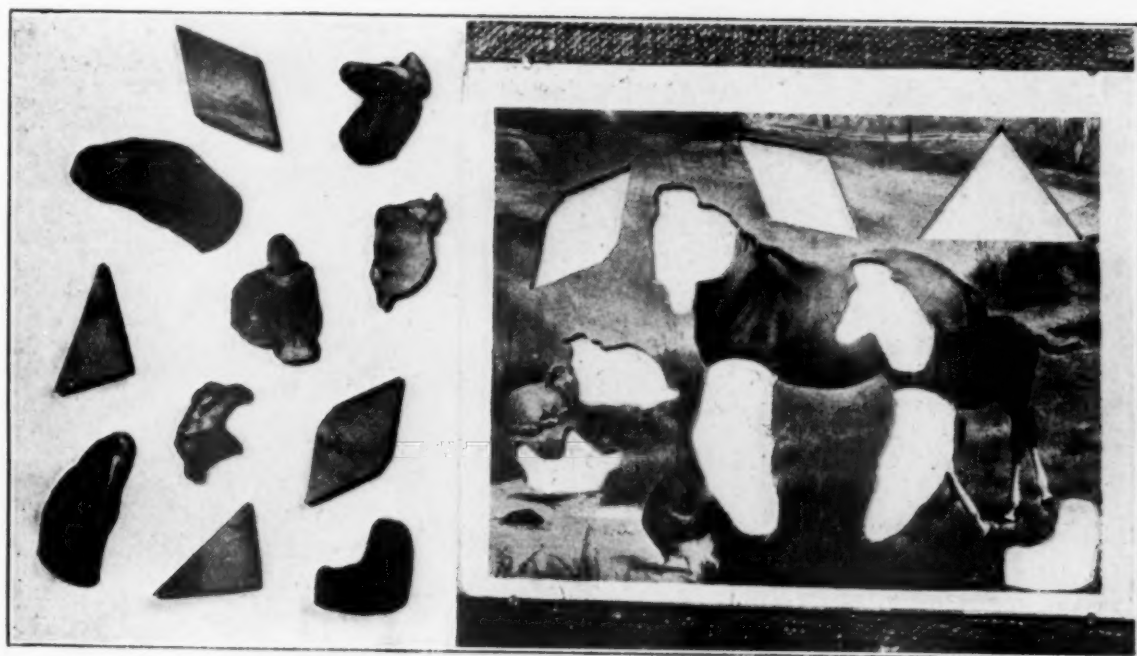
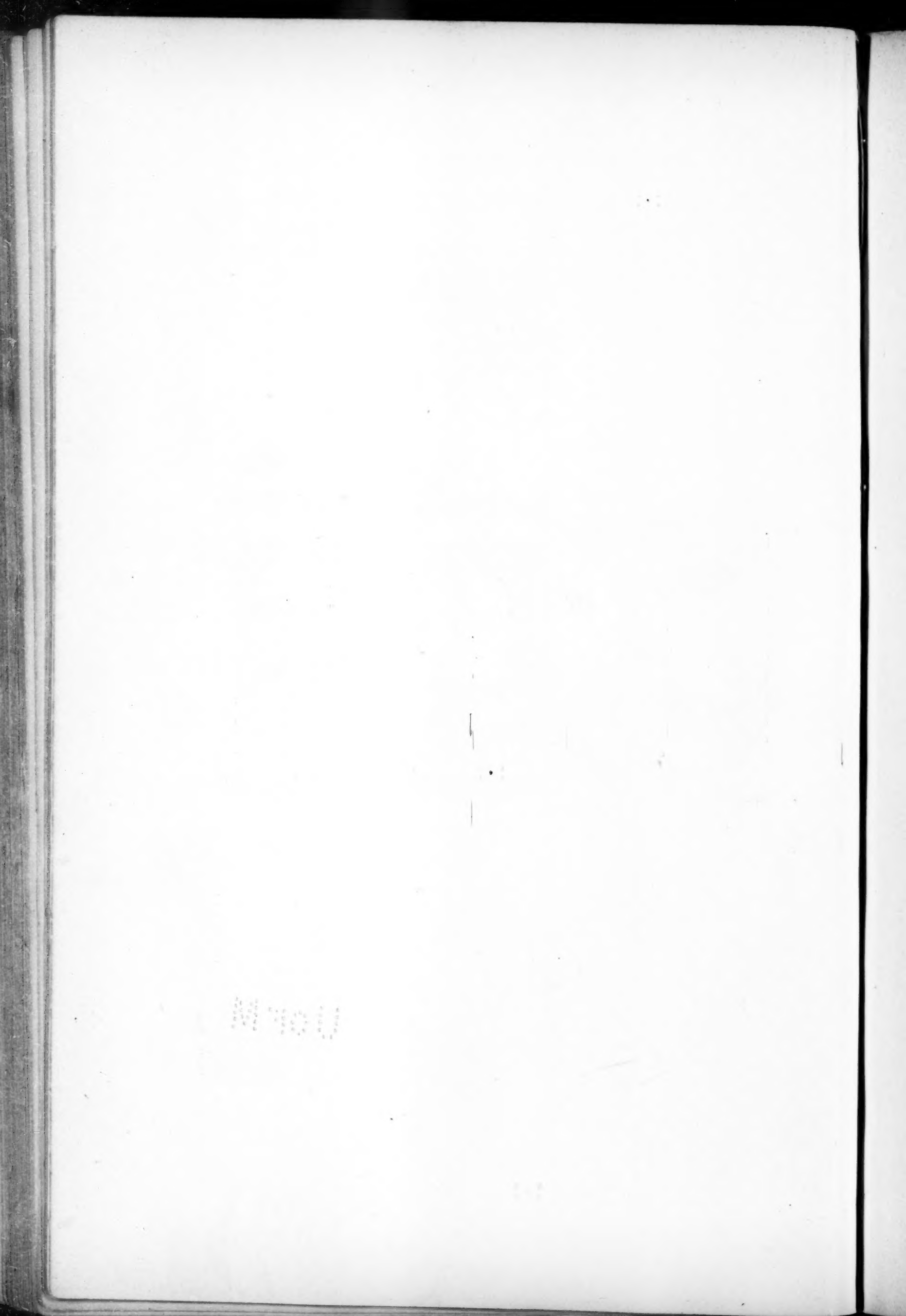


FIG. 3

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1. Time—(if the problem is not solved at the end of ten minutes, it is considered a failure and recorded 'F', or in cases where the child gives up and can not be induced to continue, the letter 'F' is recorded with the time, for example, F-6' 20'').

2. Poor perception of form; for example, trying to place a triangle in a curved opening.

3. Persistent effort to force parts into impossible openings.

4. Noticeable trial and error in working with the double triangles.

5. Noticeable repetition of impossibilities in working with the double triangles. (This test is introductorily given to invoke interest and to gain general impressions, so it does not seem necessary to quantify the term 'noticeable'.)

The record on Case 574 is:

1. 2' 5"
2. No.
3. No.
4. No.
5. No.

TEST II. SPECIAL PICTURE PUZZLE

This test was designed to show primarily the apperception of the relationships of well defined and easily recognized parts to a given whole. Beyond this it, of course, roughly demonstrates sensory discriminations of form and color. The import of this test can not be brought out except by its careful construction. The pieces are properly sawed out with a certain amount of bilateral symmetry in pairs, so that one can not readily put them in position when guided by form alone. But on every piece there has been preserved a portion of the surrounding picture, which by lines or color or both, will readily give the clue to where it belongs.

This test, again, can easily be made out of three-ply scroll-saw wood. The picture is that of a school room with eight scholars and a teacher, and is taken from that entertaining child's book, 'Jingleman Jack, A Book of Occupations,' by

O'Dea and Kennedy.¹ It should be noted in this, as in Test I, that the pieces are not cut out, as in the ordinary picture puzzle, on arbitrary lines, but represent actual parts, such as a head or an arm, in this case with a little piece of the surrounding picture. All this is clearly indicated in Fig. 4.

The test is presented to the subject with the parts well mixed up, as in the illustration, and the individual is told that here is the picture of a school, with heads and arms and things cut out and you want to see how quickly and correctly he can put them together. He is told to pick up one piece at a time, look at it carefully, and then put it in place, and that if a wrong place is tried, it will be counted an error.

Our normal 12 year old children generally do this test in from one to two minutes and make from none to eight errors. The number of errors usually made by an individual poor in general ability is quite astonishing in the light of the apparent easiness of the task. Time is here again comparatively an unimportant factor. Of undoubted great significance are the errors scored under heading three.

- Scoring.*
1. Time.
 2. Number of errors.
 3. Number of errors of impossible situations; for example, effort to put piece in upside down.

The record of case 574 is:

1. 1' 50"
2. 5
3. 0

TEST III. CONSTRUCTION PUZZLE (A).

The first sketch of this test was given us by Professor F. N. Freeman. We, however, added the idea of making the pieces partially interchangeable. The significance of the results obtained largely hinges upon this interchangeableness.

¹Published by Saalfeld Publishing Co. Akron, Ohio, 1901.

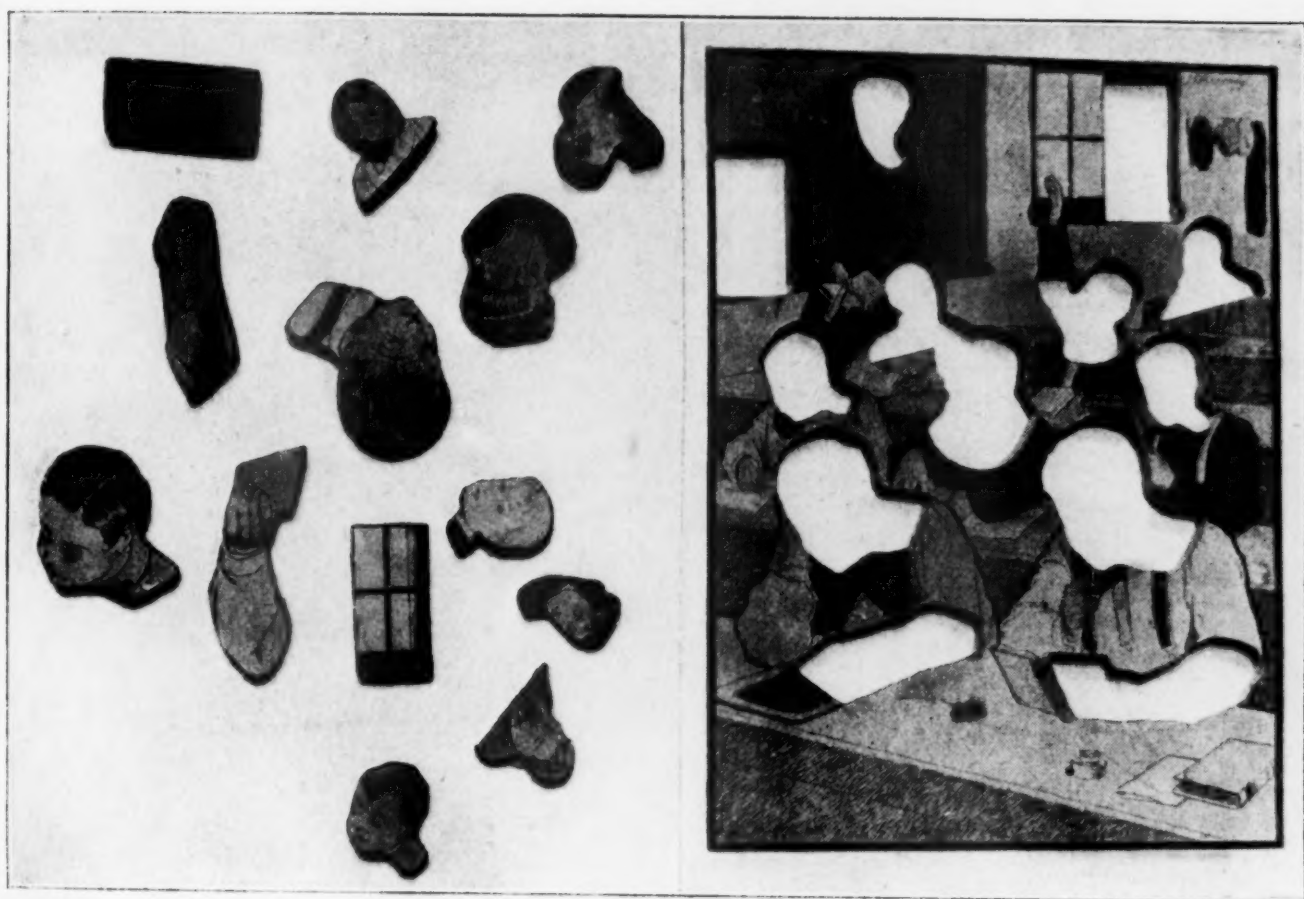
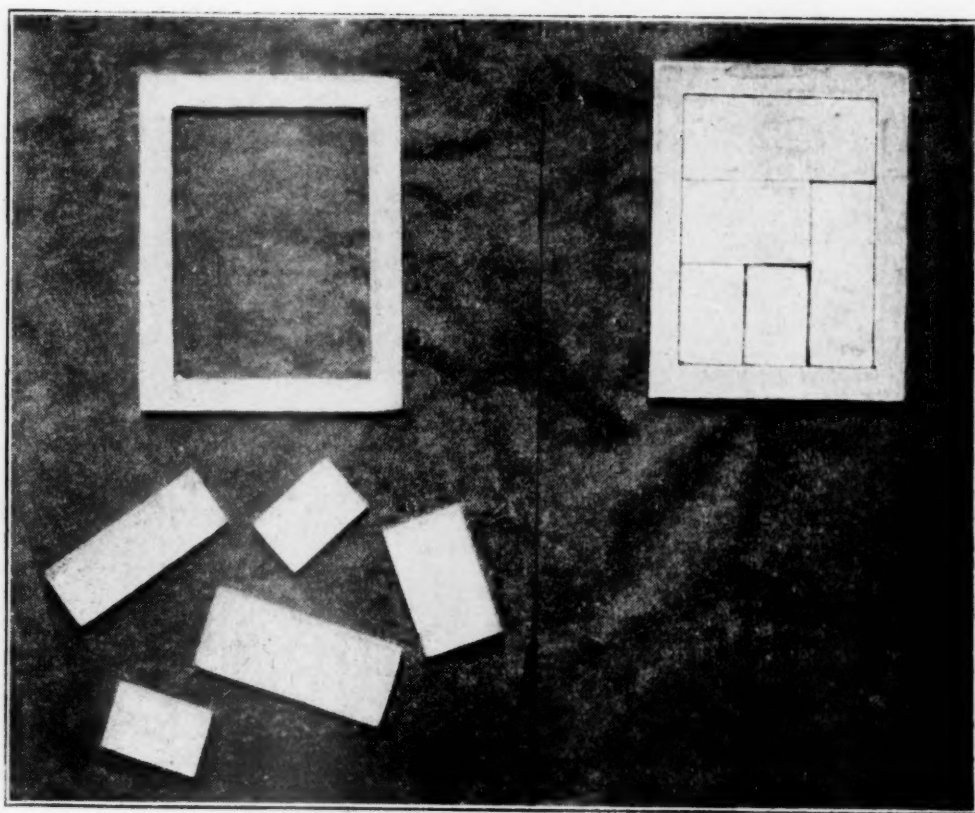


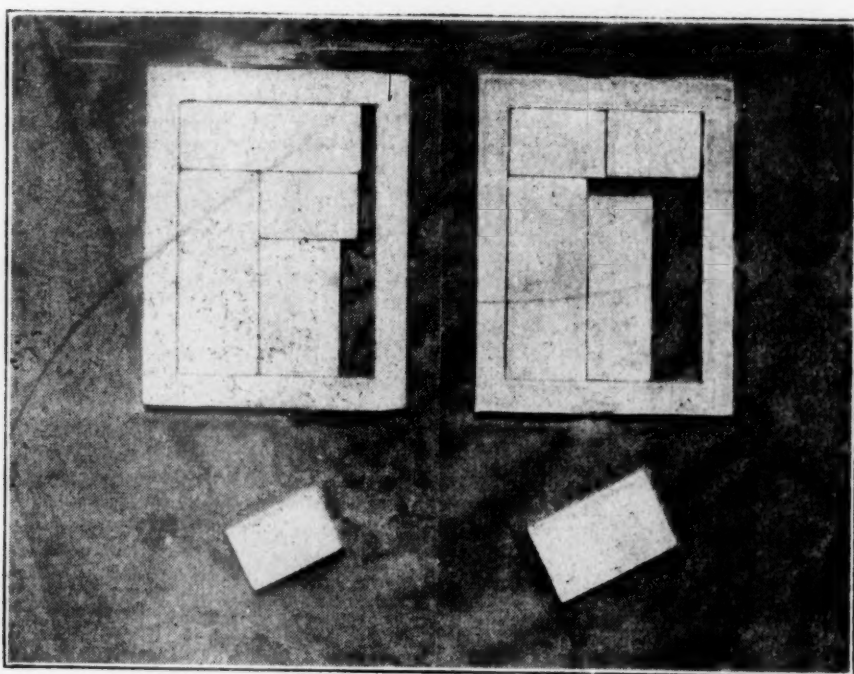
FIG. 4



a

FIG. 5

b



a

FIG. 6

b

This test brings out perception of relationships of form and also the individual's method of mental procedure for the given task—particularly his ability to profit by the experience of repeated trials, in contradistinction to the peculiar repetition of impossibilities characteristic of the subnormal and feeble-minded groups.

The test is readily and serviceably made of scroll-saw wood. The inside measurements of the empty rectangle are 4 x 3 inches. The subject is offered the test with the separate pieces irregularly disposed, as shown in Fig. 5 a, and is told that the space can be exactly filled up if they are put in correctly.

It would seem quite apparent that for estimating mental ability the method pursued in this task is of much greater value than the actual time. Probably all would acknowledge that a trial method, where the subject proceeds intelligently from one apparent possibility to another, even though a relatively long time is consumed, will not necessarily indicate lack of native ability. We find that most of our twelve year old children do this puzzle in time ranging from 12 seconds to 2 minutes.

Scoring is simplified by the following procedure: Each piece put in the frame and left there is easily recognizable as belonging under one or more of the heads described below under 2, 3, and 4 and a check mark may be placed in an appropriate column.

1. Time. (Failure recorded as in Test I.)
2. Number of moves made. (Five being the least number in which the task can be accomplished.)
3. Number of moves of obvious impossibilities, i. e., cases in which a piece is left in an evidently impossible situation, that is, where it leaves a space obviously unfitted to any of the remaining pieces,—for example, the narrower spaces shown in Figs. 6 a and 6 b.
4. Repetition of such obvious impossibilities.

Record of Case 574 is;

1. 19"
2. 7
3. 0
4. 0

TEST IV. CONSTRUCTION PUZZLE (B)

This test is the design of Dr. Grace M. Fernald, following the suggestion of Dr. W. F. Dearborn. Its purpose is to show the individual's perception of relationships of form and also to bring out his power to plan a bit of work, that is to say, his ability to see the possibility or impossibility of situations before they are actually attempted. The ability to profit by the experiences of trial and success or failure is so important, that for its estimation it seemed distinctly worthwhile adding a somewhat harder task of the type of Test III. When the performance has been remarkably good in Test III. we have occasionally felt sure that it was partly due to chance and so wished to carry the investigation further on this point.

The pattern is easily cut out of scroll-saw wood, but it is absolutely necessary that the parts be exactly made so that they are interchangeable throughout. Otherwise the significance of the results will be lost. The standard width of all the spaces in the pattern is one and three-eighths inches. The spaces which have only one rounded end are five inches long and the rectangle is two inches long. From these dimensions and the pattern as shown in Fig. 7 the design can be readily drawn.

The test is presented to the subject with the pieces well mixed up as in the illustration. He is told that if the pieces are put in correctly they will exactly fill all the spaces and he is to see how quickly he can put them in their proper places. In this test, again, it seems to us that a trial and success method can not be regarded as at all derogatory to native ability, but it does seem clear that in such a procedure the constantly getting of one's self back into old impossible situations is, on the contrary, evidence of poor ability. The shrewdest method pursued is to eliminate the small pieces which can only fill up certain definite spaces. Some of our subjects deliberately do this. A common result of faulty placing of the pieces is shown in Fig. 8. Time, again, in this test is hardly to be considered so important as estimation of the method pursued. Most of our twelve year old children are successful in from one to three minutes.

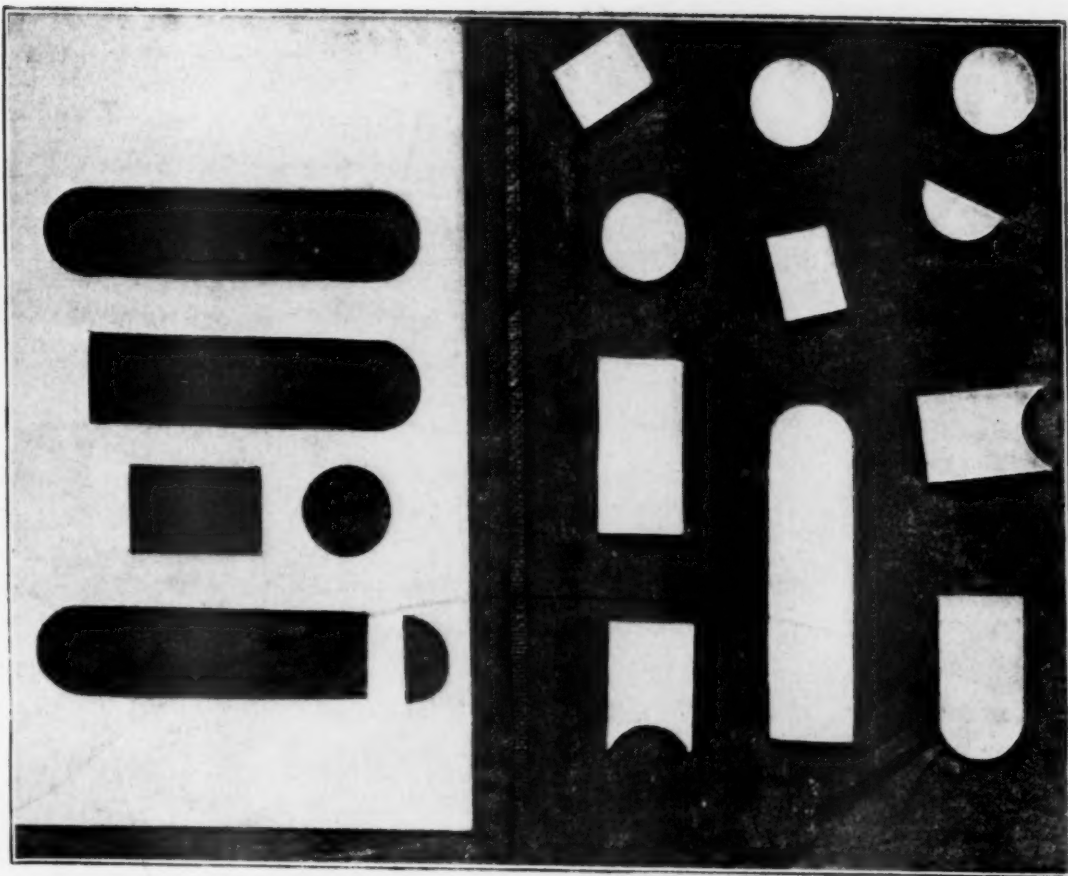


FIG. 7

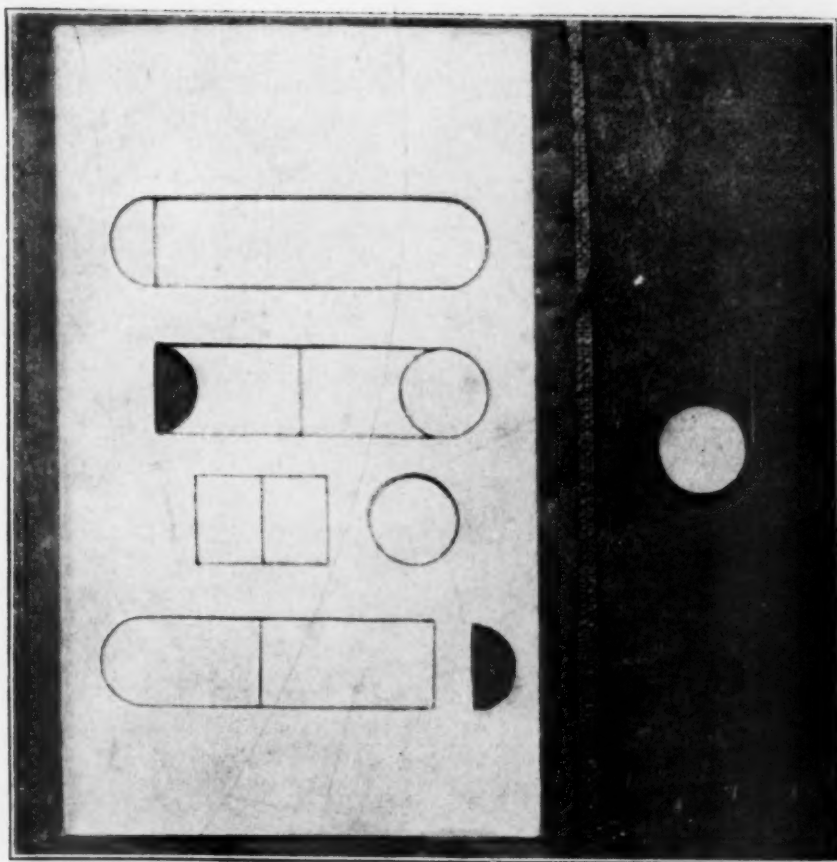


FIG. 8

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Scoring; A very ingenious method of recording the actual number of moves and their significance has been devised by Dr. Mary H. S. Hayes. For this purpose the separate pieces are designated by numbers, which, since they come in order downwards, are easily remembered. With a rough tracing of the empty spaces an accurate and self-explanatory score sheet may be very easily filled in. The small exponent by the side of the piece-number shows the serial order of the move made. A line drawn through a piece-number means that it was removed and the exponent at the end of the line shows the number of the move. The method is shown in Fig. 9.

PIECE NUMBERS FOR SCORING TYPICAL SCORE SHEET

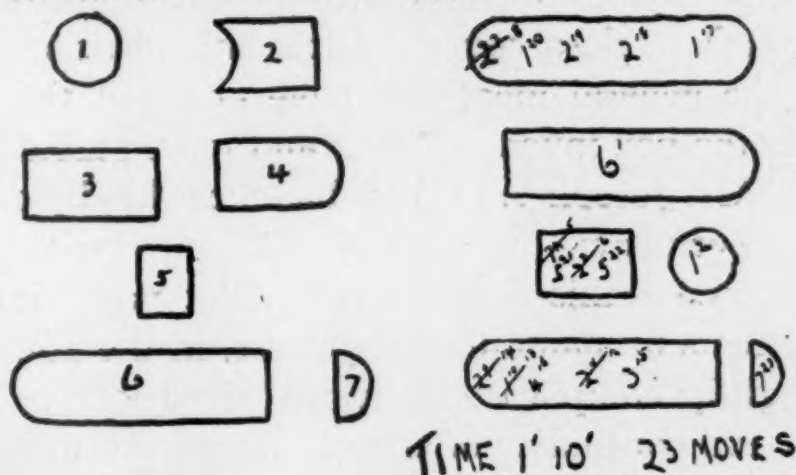


FIG. 9

The points for final record have not yet been determined by us because this improved method of graphic scoring we have only recently adopted. Prior to that we registered time and made a rough estimation of the intelligence of the procedure. In a later contribution on the standardization of the tests we hope this will be covered. For typical, graphic record see Fig. 9.

Record of Case 574 is;
Time; 55'' Moves; 19.

TEST V. PUZZLE BOX

The development of this test resulted from suggestions received from a number of sources—the animal experimenters, and Thorndike, Woodworth and others. The box at present in use is one somewhat modified from the general design of Dr. Grace M. Fernald, whose original plan was of a box fastened by a hasp, staple and bolt which could be opened only by following a definite sequence of five or six steps. These steps consisted of the manipulation or removal of fastenings both outside and inside the box, the latter being accomplished by means of some tool which could be thrust for that purpose through certain openings—the whole procedure to be learned and studied by direct observation. The inside could be seen through a glass cover. Later modifications have not affected the general idea, but have changed the procedure and made the box much stronger and more stable as a working test. Mr. Joseph W. Hayes has most kindly contributed these improvements.

The purpose of this test is obvious. It may bring out abilities or defects in manipulative powers, in the ability to analyze a slightly complicated physical situation, in powers of attention and continuity of effort.

The description of this box is best made with reference to the illustration, Fig. 10, and to letters which may serve to designate the sequence of steps in the opening of the box. A curved bolt-hook (*A*) on the front side of the box is held in place by a ring (*B*) to which is attached a blue string running through a hole in the side of the box and up through another ring (*E*) and ending in a ring (*C*) which goes over a perpendicular arm of a post (*D*). Directly opposite to this is a hole in the front side of the box for manipulation by the long button hook, which is used as a tool. This blue string is held taut by the ring (*E*) which is in turn attached by an orange colored string to a ring (*F*), which is seen fitting over a post (*G*). A cross piece prevents this ring from slipping down too far. Opposite to this post there is a hole in the back side of the box. The last mentioned ring (*F*) is held in

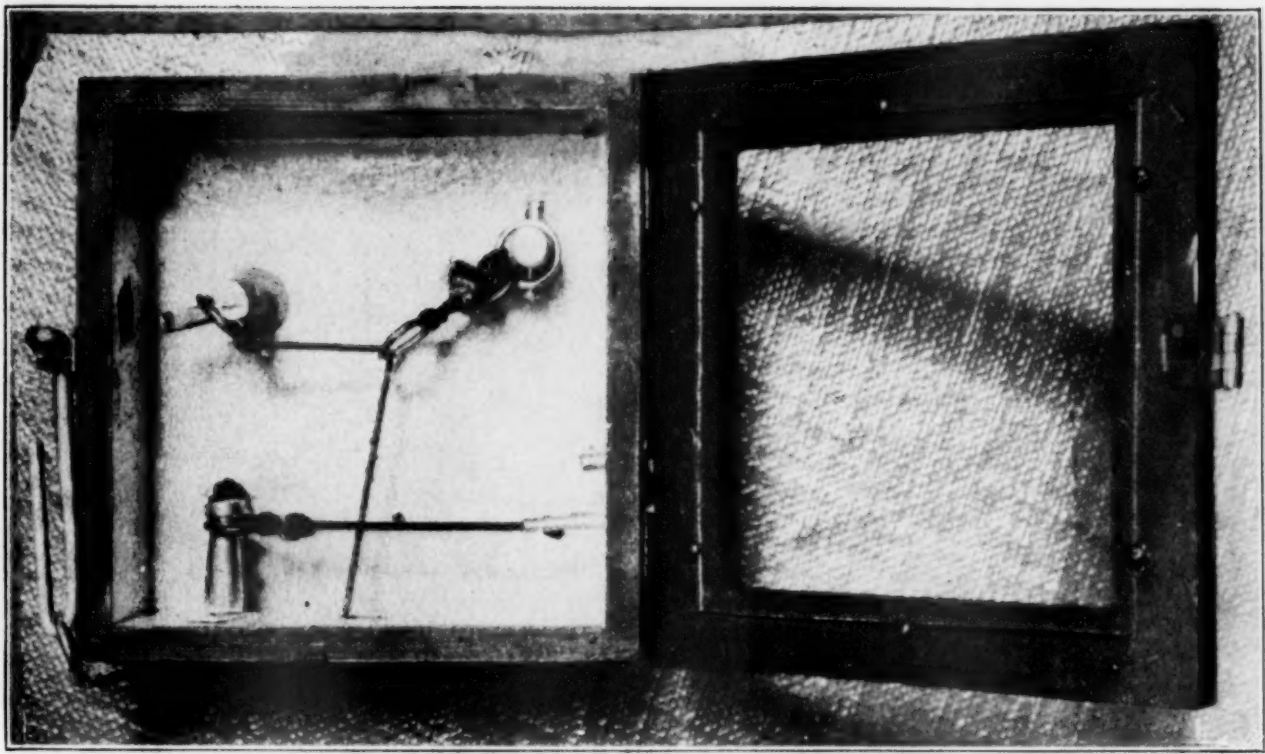


FIG. 10

U. of M.

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place by a green string, which passes through a hole in the floor of the box, which may be seen near the post (G). This green string now passes under the box and ends in a ring (H)—not to be seen in the illustration—which is held in place by having the short arm of the staple (I), when released from the box, passed through it. The staple (I) is held tight by a red string attached to one arm which ends in the ring (J). This ring slips over a post (K) which is fastened to the side of the box. The hole for the manipulation of this last ring is in the floor of the box directly below the head of the last mentioned post.

The color of the strings is, of course, arbitrary and is made different in order to facilitate the tracing of the sequence of events necessary in opening the box. One removes first the ring over the post (K) and pulls out the staple from its holes in the back of the box, releasing the attached ring. Next the ring over the post (G) is lifted off, which loosens the short orange colored string so that the ring on the arm of post (D) can be readily removed. This then so loosens the blue string that the final ring can be pushed over the curved arm of the bolt-hook and the latter may be withdrawn, the hasp lifted and the box opened.

The box itself must be strongly made. The bolt-hook, posts and staple may be made of aluminum and the posts are securely held in place. The procedure in giving this test is comparatively simple. The subject is told that he should look the box over thoroughly before beginning and that he can use the button hook. No parts must be cut or destroyed. He should be told all this and also that if he does the right things in the right order the box may easily be opened. Finally before putting it in his hands, one should say, "Now see how quickly you can get it open."

It is obvious that the general results obtained from this test must vary greatly, but there seem to be three main types of approach to the problem; first, random trials; second, intelligent profiting by the experiences of trials and successes or failures; third, conscious analysis of the puzzle as a whole with recognition of the relation of the parts. Of course, on

account of the differences in strength and manipulative power there would, other things being equal, be considerable difference in the times taken by the subjects. Indeed, altogether it has seemed to us that the method employed by the subject is of more significance than the time. Most of our twelve year old subjects have opened the box in from one and a half to nine minutes, but a certain number have finally failed.

- Scoring;* 1. Time. (If the problem is not solved at the end of 15 minutes, it is considered a failure and recorded 'F', or in cases where the child gives up and can not be induced to continue before that time, the letter 'F' is recorded with the time.)
2. Attitude of subject.
- (a) Interested and making an effort to solve the problem.
 - (b) Helpless turning around of the box and protesting he can't do it.
3. Method of procedure.
- (a) Point of attack—
 - (b) Step 1. Removing ring J from post K—time spent in doing it.
 - (c) Step 2. Pulling out staple I and releasing ring H—time spent in doing it.
 - (d) Step 3. Removing ring F from post G—time spent in doing it.
 - (e) Step 4. Removing ring C from arm of post D—time spent in doing it.
 - (f) Step 5. Removing ring B from hook A—time spent in doing it.
 - (g) Step 6. Removing hook A and opening box—time spent in doing it.
 - (h) Error 1. Tugging at bolt-hook A out of order—time spent in doing it.
 - (i) Error 2. Trying to remove ring B out of order. Time spent in doing it.
 - (j) Error 3. Trying to remove ring C out of order. Time spent in doing it.

- (k) Error 4. Trying to remove ring F out of order.
Time spent in doing it.
- (l) Error 5. Trying to pull out staple I out of order. Time spent in doing it.
- Additional errors, such as tugging at the strings, are noted in the record.

Record of Case 574 is;

1. 1' 25"
2. (a) Yes.
(b) —
3. Point of attack Ring J
 - Step 1. 10"
 - Step 2. 5"
 - Step 3. 15"
 - Step 4. 2"
 - Step 5. 5"
 - Step 6. 5"

Record of Case 573, (girl, 17 years old,) is;

1. 4' 6"
2. (a) Poor interest.
(b) —
3. Point of attack Ring F
 - Error 3. 15"
 - Error 2. 10"
 - Error 3. 5"
 - Step 1. 15"
 - Step 2. 10"
 - Error 2. 40"
 - Step 3. 20"
 - Step 4. 20"
 - Step 5. 15"
 - Step 6. 5"

TEST VI. 'AUSSAGE'—TESTIMONY FROM A PICTURE

This is our adaptation of one of the tests of those German psychologists, particularly Wilhelm Stern, who have done so

much to develop a most important line of research on the individual's ability to give accurate testimony.

The purpose of this test in our hands is to discover the power of the subject to report faithfully what he has seen. We find that incidentally we may sometimes ascertain also certain facts that throw light not only upon sense perceptions and recall, but upon other mental characteristics which might possibly have to do with the moral make-up of the individual. These are suggestibility, imaginativeness, powers of dramatization, unswerving honesty of report and so on.

The only picture thoroughly adapted to our needs that we could find after long search was of a butcher shop, Fig. 11. This likewise was taken from "Jingleman Jack"*. Every child whom we have seen has been familiar with such a shop and most of the objects depicted in the picture.

The method we pursue is to tell the subject that we have here a picture of a butcher shop, and we are going to show it to him for a short time. In that time he must study it thoroughly. After that he must tell us all he has seen and then we will ask him all sorts of questions about it, about things that were perhaps there and perhaps were not there. Then we place the picture in his hands so that a good light falls upon it. He is given from ten to fifteen seconds to look at it, and then, quickly taking it away, we ask him for his own account of what he saw. This is written down almost verbatim. After he is through with his free recital, we carry on a kind of cross examination, which is calculated to bring out details of the picture which he may have forgotten, as well as his suggestibility. During the course of this cross examination, we definitely ask about unmentioned details of objects and actions, about the colors of the butcher's shirt and hat, of the dog and of the woman's dress. To bring out his possible suggestibility we get him to name all that he saw hanging on the side wall and then, after asking another question or two, inquire if he saw the bunch of bananas. Bananas are not in the picture, neither are the elec-

*Vide Test II.



FIG. 11

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tric light, nor the box for scraps, nor meat visible in the ice-box, nor saw-dust on the floor, all of which we inquire for while we are asking for the other things which are really there. The answers are all written down as memoranda by the investigator.

Often this test brings out very interesting results with regard to the power of recall and the adventitious use of the imagination, with regard to suggestibility, veracity, and, rarely, power of dramatization. Occasionally it has seemed that the results obtained have had some correlation with the delinquency, as in the case of extreme mendaciousness. Subjects are nearly always interested in this test. The results obtained differ extremely, but sometimes we seem to have very definite types of response. There is the down-right honest response from the subject who is sure that he recalls nothing but what was there and who if he is not certain that he has seen a thing will say so. There is the shrewd response given by a subject who seems to calculate on the probability of some of the suggested objects, saying, as it were to himself, 'I'll tell them it's there because they ask for it and it may really be there.' Then there is the loquacious lying response offered by the subnormal individual who apperceives very little indeed of what there is in the picture. As a contrast, we find the subject who visualizes the whole panorama of events and with word and gesture vividly dramatizes the situation. We know that we are justified in trying to estimate some phases of suggestibility in this test, because of the many individuals even of twelve years old or less who are quite sure that the objects suggested to them are not present in the picture. The significance of the accepted suggestion or of the testimony in general may be very complex, but when one notes the sturdy responses often obtained from children who are both bright and honest, one must believe that the differences between these results and the markedly inferior reports may mean a good deal.

Scoring; From the memoranda jotted down while the examination is in progress, the following points seem worth scoring.

1. Number of details.
 - (a) obtained by free recital.
 - (b) imagined details.
 - (c) correct details obtained by questioning.
 - (d) erroneous details.
 - (e) details of color, $\left\{ \begin{array}{l} \text{correct.} \\ \text{incorrect.} \end{array} \right.$
2. Mode of response.
 - (a) Enumerative.
 - (b) Functional. In cases where the response is partly of one kind and partly of another, it is recorded by means of a fraction—for example, (a) $\frac{1}{2}$, (b) $\frac{1}{2}$.
3. Suggestibility.
 - (a) Number of probable suggestions accepted.
 - (b) Number of improbable suggestions accepted.

Record of Case 560 is;

"Saw butcher with sausages in hand and some lying on counter to be wrapped up and chopper with cleaver. Meat hanging; legs of beef. Woman had basket, girl had something—bread. Dog was reaching up sniffing at sausage. Other meat besides. Don't know any more."

Cross exam.—Butcher is spry-looking man, had smile. Not large man, thin looking, apron on, strap went over his shoulders and around him, had lots of hair, no cap. Sausages in one hand, knife in the other. Scales weren't in there. Ice box—no. Don't know meat on side wall. Think she had pocket book in other hand. Only one knife seen.

Color—shirt—not noticed. Dress—sort of brown. Dog—white, had spots on him. Butcher's hair—brown.

Suggestibility—0.

Non-suggestibility. Bunch of bananas. Box for scraps. Meat in ice box. (Didn't see ice box.) No electric light. Didn't see sawdust.

1. (a) 14
(b) 2
(c) 7
(d) 5
(e) correct 1
incorrect 2.
2. (a) $\frac{4}{5}$
(b) $\frac{1}{5}$
3. (a) 0
(b) 0

TEST VII. VISUAL MEMORY OF GEOMETRIC FIGURES

This is a well known Binet test and forms one of the simplest of our series. It is usually denominated a visual memory test, but particularly in the second figure the observer can often easily determine that the motor method of learning and recall is partly used.

The designs as shown in Fig. 12 are drawn in heavy black lines and the dimensions of the large rectangle are about

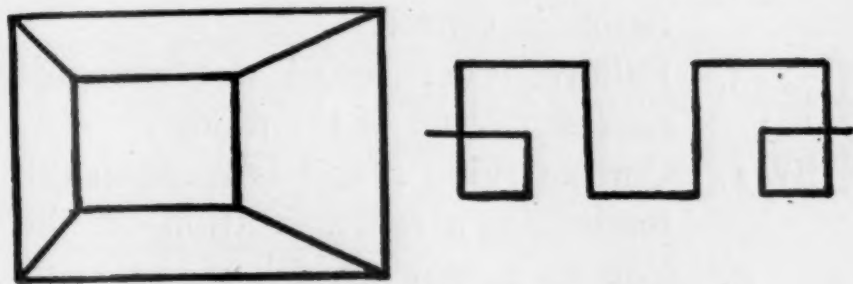


FIG. 12

3 x 2 inches. The total length of the other design is 3 inches, width 1 inch.

The subject is told that we are going to show him a figure for a little while and we want him to draw something that looks like it. We tell him he need not take much time to draw it because we do not care if it is not drawn well. We simply want him to show us what it looks like. The rectangular design is shown for five seconds, is withdrawn and the child told to draw it. If there is any question, as there sometimes is, as to whether he means the inner figure to be

represented as in the center of the large figure or not, he is asked to tell its relative position. If the figures are extremely poorly drawn, he may be asked to repeat after another look at the model. The second figure is exposed for five seconds in the same way.

The commonest error in reproducing the first figure is due to the lack of perception that the second rectangle is not in the middle of the first. The commonest error in the second figure is due to the lack of symmetrical reproduction of the parts. In the attempt to learn this last figure it may be often observed that the subject's eyes follow the lines and his fingers trace them in the air. The first figure is reproduced correctly by most of our twelve year olds, but a less number are successful with the second.

Scoring; the result of the test itself is its own record. Scoring points are as follows for the two designs (a) and (b):

- (a) 1. Correct, viz., result is recognizable as intended for a representation of the model.
- 2. Correct except for error in placing small figure in center.
- 3. Failure, viz., result not recognizable as representation of the model.
- (b) 1. Correct, viz., result is recognizable as intended for a representation of the model.
- 2. Correct except for lack of symmetry.
- 3. Failure, viz., result not recognizable as representation of the model.

The record of Case 574 is:

- (a) 1. Yes.
- 2. —
- 3. —
- (b) 1. Yes.
- 2. —
- 3. —

TEST VIII. LEARNING TEST—ARBITRARY ASSOCIATIONS

Our method in this test is a variation on suggestions offered by Whipple, Dearborn, MacMillan and Bruner, all of whom have had experience with somewhat similar tests.

The purpose in this is to get a gauge of the powers of attention and the ability of the subject to establish a comparatively easy set of associations.

1 2 +³ Δ =⁵ L X O C

O) Δ
+ = X
L) C
X □ =
) L Δ
+ □ C
Δ X)
O = C
L + □

+ O Δ
) □ X C
=) L

FIG. 13

Nine clearly made symbols with numbers attached are presented together with 27 similar, but unnumbered symbols, three of each kind. These blank symbols are given for the

L

□

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subject to fill in as part of the learning process. On a portion of the sheet, which is turned under until it is used, there are placed ten unnumbered symbols, one being repeated in order to gauge the intelligence of reaction to that particular phenomenon. The make-up of the whole pattern can be plainly seen in Fig. 13. The subject is asked to fill in the numbers of the 27 practice symbols and after he has done this, he is told to study well the top line until he thinks he knows it. Then the sheet is turned over and the subject is told to fill in the numbers from memory.

We find plenty of children even of eight and ten years quite able to do this task without errors. Experience with this sort of test indicates that it is done relatively more readily by the child type of mind than by the adult type.

- Scoring:*
1. Number of errors or omissions in graphic learning.
 2. Number of errors or omissions in reproducing.
 3. Placing the same number in different figures in the reproduction, for example, the number 4 in both the triangle and the square.
 4. Placing different numbers in the repeated figure in the reproduction.
 5. Introducing in the reproduction a number not given, for instance, 10.

The record of Case 574 is

1. 0
2. 0
3. No
4. No
5. No

TEST IX. CROSS LINE TEST (A)

This test and Test X were first suggested for our use by Dr. D. P. MacMillan. We later found that they had the historically interesting use which is described in Test XI.

These three tests are especially noteworthy and valuable because their correct performance seems to demand mental powers which appear strongest in the normal adult mind and which are weakest in mentality of the child type. The process involved is certainly complex. It appears to call for the power of mental representation of the model, together with the ability to analyze out its parts and recall by visual memory and, perhaps, by a definite logical process the numbers corresponding to the parts. This one is simplest of the three.

The procedure we have found most useful in giving the test is as follows:—

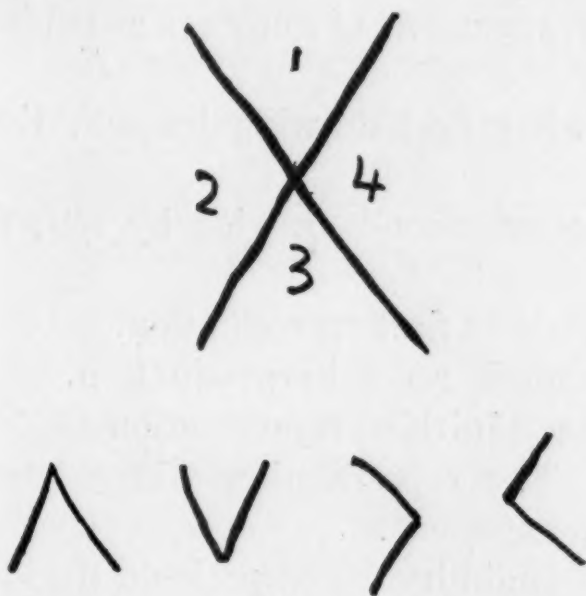


FIG. 14

The cross lines represented in Fig. 14 are drawn on a good sized sheet of paper in front of the subject, the investigator, at the same time, calling his attention to the fact that the whole figure is made up of parts or compartments. Then the figures are placed in the spaces, emphasis being laid upon the order in which the numbers are placed with regard to the figure. This having been done while the subject has had a good chance to look at the model, it is turned over and the different angles representing the different spaces of the main figure are drawn one at a time and not in regular order. As each part is drawn the subject is to tell what number belongs in it before the next part is drawn. If there are any mistakes,

he is allowed to draw and number the whole figure for himself and try again and so on until, if necessary, three reproductions have been made. He is shown any errors in his own drawing. Twelve year old children rarely fail in this test which serves substantially as a practice test for X, B.

Scoring; The record sheets themselves are, of course, direct evidence of the work done, but for a final score the following points are to be checked if positive.

1. Correct in first reproduction. (Where errors are made but corrected without assistance indicate by c.)
2. Some wrong in first reproduction, but these errors explained by arrangement of numbers as subject remembered them.
3. Correct after first drawing by self, that is in second reproduction.
4. Correct after second drawing by self, that is in third reproduction.
5. Errors made in first reproduction.
6. Errors made in second reproduction.
7. Errors made in third reproduction.
8. Failure. The reproduction where it occurred being indicated by an exponent.
9. Failure. Inability to comprehend the idea after careful explanation and several illustrations.
10. Numbers incorrectly arranged in own drawing and corrected for him. Which drawing indicated by an exponent.
11. Repetition of the same number in different situations.
12. Addition of a number not in the original drawing.
13. Inability to draw the figure correctly from memory.

Record of Case 574 is:

1. Yes.

TEST X. CROSS LINE TEST (B)

The general idea of this test will be readily understood by reading what we have said under Test IX. The main purpose is the same, but the results obtained have been found considerably more interesting and instructive on account of the greater complexity of the figure.

The procedure in giving this test has only slight variations from the preceding one. After the explanation is made and the numbers filled in as shown in Fig. 15, one element of the large figure is drawn, (always the seventh space, as shown in the illustration) and the subject is asked, "What number goes into it?" This is to make sure that the subject understands the problem. Having been given a good chance to look at the model for a moment and emphasis having been placed on the order in which the numbers are written in the

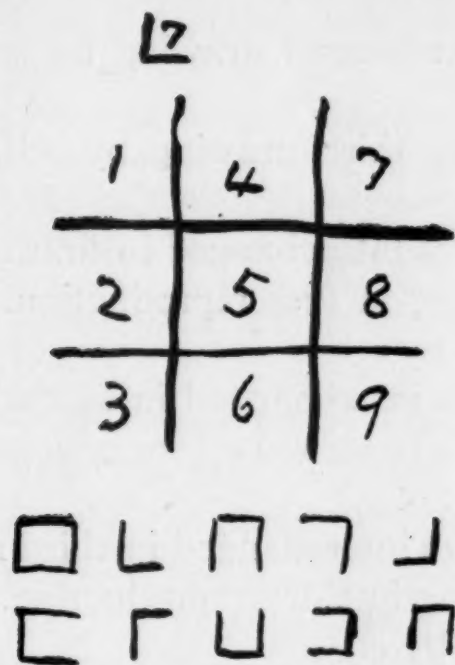


FIG. 15

spaces of the main figure, the model is turned over out of sight and the elements are drawn one by one, but not in numerical order, as the subject tells what number belongs in each. We are now trying to bring in the factor of encouragement by offering the easier elements first, namely, the fifth followed by the seventh, and then proceeding at random. If there is a failure, a chance for reproduction and retrieval is given as in the previous test. As many retrials as desirable, may be made.

On account of the readily ascertained differences in performance between bright subjects and dull subjects, we have come to regard the test as extremely valuable. About half of our twelve year old children have so far done this correctly on first trial.

Scoring: Again, on this, the original record is its own evidence of the performance, but for final registration the following points may be checked:

1. Correct in first reproduction. (Where errors are made but corrected without assistance indicate by c.)
2. Some wrong, in first reproduction, but these errors explained by arrangement of numbers as subject remembered them.
3. Correct after first drawing by self, that is in second reproduction.
4. Correct after second drawing by self, that is in third reproduction.
5. Correct after third drawing by self, that is in fourth reproduction.
6. Two numbers interchanged in first reproduction.
7. Several wrong in first reproduction. (Error in center square designated by c.)
8. Two numbers interchanged in second reproduction.
9. Several wrong in second reproduction. (Error in center square designated by c.)
10. Two numbers interchanged in third reproduction.
11. Several wrong in third reproduction. (Error in center square designated by c.)
12. Two numbers interchanged in fourth reproduction.
13. Several wrong in fourth reproduction. (Error in center square designated by c.)
14. Failure. The reproduction where it occurred being indicated by an exponent.
15. Failure. Inability to comprehend the idea after careful explanation and several illustrations.
16. Numbers incorrectly arranged in own drawing and corrected for him. (Which drawing indicated by an exponent.)
17. Repetition of the same number in different situations.
18. Addition of a number not in the original drawing.
19. Inability to draw the figure correctly from memory.

Record of case 574 is:

1. Yes (c) — prompt.

TEST XI. CODE TEST

A code that was used for secret correspondence during the civil war was communicated to us indirectly from an old army officer. It at once appeared to be the parent of the two foregoing tests, as will be seen by the accompanying illustration, Fig. 16. The code was quickly appreciated by us as a worthy member of our series. While its elementary parts are the same as those of the foregoing two tests, the task of working up a code sentence without copy introduces

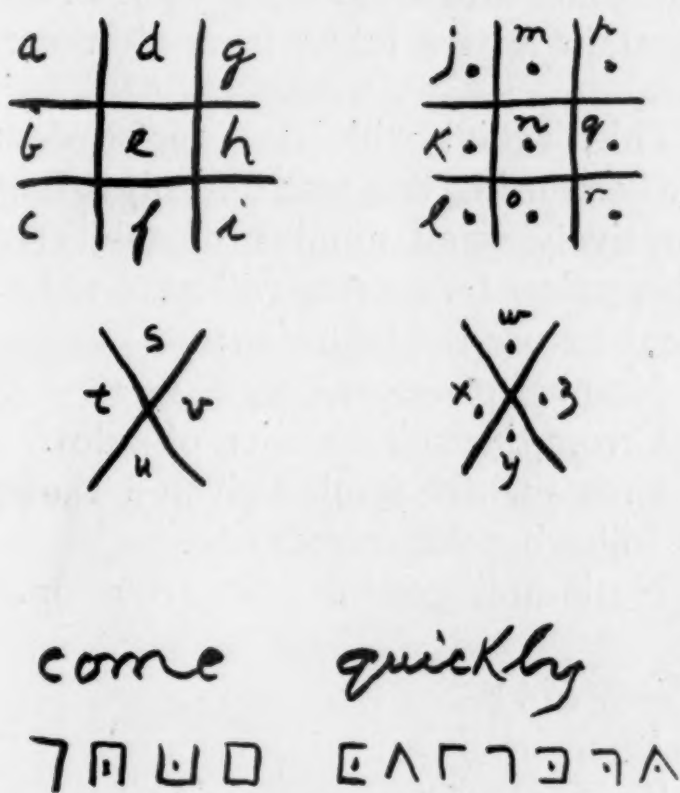


FIG. 16

a necessity for close attention and steadiness of purpose which is not equalled in any of our other work. In this test no object of interest is held in the hands, there is nothing to look at that bears on the task and the investigator is not offering the same stimulus to attention which obtains in the giving of the previous two tests. The scheme of the test is easily understood, especially if the other two tests have been previously given. The second of each of the two main figures is like the first except that each element contains a dot.

This gives twenty six different elements or spaces each to contain one letter of the alphabet. The elements and the order of the letters with regard to them being established and made plain, it becomes an easy matter for a bright subject to recall the general scheme of the code and to work out its parts in his own mind and to write a code word or sentence. Older children have been fairly fascinated by this interesting test and some have been able to write the prescribed sentence with little hesitation. We have used the words, "Come quickly" in the test partly on account of appropriateness of the phrase in connection with a war time code, but mostly because the words contain letters taken from all the main figures.

Scoring: This, again, will have to be developed later since we have been using this test for only a few months and on a comparatively small number of subjects. Types of failure or other points for scoring will have to be worked out. For the present we use the following:

1. Number of errors.
2. Errors through omission of a dot.
3. Errors where symbol given is that preceding or following the correct one.
4. Noticeably good or poor attention.

Record of Case 574 is:

1. I
2. 0
3. 0
4. Good. (Kept steadily at job.)

TEST XII. MEMORY FROM VISUAL VERBAL PRESENTATION

We have found that for purposes of memorizing, at least for city children, a passage about a fire offers great interest. On this suggestion, Miss Clara Schmitt wrote and first used for us the following passage which for scoring may be divided into twenty details.

If a man finds that the house is on fire | he should first look to see if it is a large fire. | If it is a small one | he should quickly pour water on it | or smother it. | But if it is large | he should run to the fire alarm box | calling out 'fire' | to the other people in the house. | Then he should go back | and help old or sick people | and little children | to escape from the burning building. | When all the people are out, | if there is time, | he may save valuable things | such as money or jewelry. | Then when the fire engine comes he | may help keep the crowds of curious people out of the way | so that the firemen may work more easily.

The nature of the test is explained to the subject and he is asked to read aloud the first sentence to see if he is capable of doing so. Then he is told to read it to himself very carefully once because we are going to ask him to tell all about it. We tell him, "We don't care if you don't say exactly the same words, but just tell us about everything it says and give everything in the right order." It is not difficult to take down as a matter of record the exact words given in response.

The significance of this as a memory test is great, but the subject's ability to read and to understand the words read must always be taken into account. By our very instructions we imply the fact that we do not count verbal accuracy in the same category of value as the recall of the ideas and logical sequence.

- Scoring:*
1. Number of details.
 - (a) Authentic.
 - (b) Imagined.
 - (c) Erroneous.
 2. Verbal Accuracy.
 - (a) Complete.
 - (b) Partial.
 - (c) No attempt at verbal accuracy.
 3. Logical Sequence.
 - (a) Logical sequence, apparent appreciation of.
 - (b) Recital of inconsequential details.

Record of Case 574 is;

(Reads passage very rapidly to himself.) "If a man finds that his house is on fire first he should find if it is a big fire.

If not, pour water over it. If it is a big fire he should go to the fire alarm box and on the way out call to people, 'fire.' If there are old or sick people he should go back and help them out. If time then should save valuables and jewelry. Next when firemen come should keep crowds back so firemen can work.

1. (a) 17
(b) 0
(c) 0
2. (a)
(b) Yes
(c)
3. (a) Yes.
(b)

TEST XIII. MEMORY FROM AUDITORY VERBAL PRESENTATION

The scope and plan of this memory test was suggested by Professor Thorndike. We have written a definitive bit of exposition about a theme which has a special child interest. For purposes of scoring it may be divided into twelve details.

"If a sailor | on the ocean | is shipwrecked | in a wild country, | he must first look for water to drink, | then he must find a place to sleep | where wild animals can't get at him, | and after that he can take time to look for food, | but he must be careful not to eat poisonous berries or fruit. | Next he had better hunt for other people on the land | and put up a flag | to stop ships which may be going by."

One says to the subject, "I am going to read a story to you four times and then ask you what I said. I don't care if you don't give me the exact words, but tell me as nearly as you can, all the things I said to you and in the same order." It is then read four times clearly and with varying rapidity and emphasis. We have tried reading this passage a less number of times, but have always been dissatisfied with the results and have come back to Thorndike's original suggestion. This and the preceding test are, of course, tests for memory, but in as much as they are passages which may

have mental representations in pictures, they are not necessarily simply verbal memory tests. They partake of the complicated nature of many memory processes.

The results seem to be worth most if calculated in terms of how the logical sequence is given, how many details are recalled and with what verbal accuracy, or transposition into the child's vernacular. As would be expected by anyone familiar with the capabilities of children, we have sometimes gotten almost verbally accurate results from those of twelve years and younger. Without much difficulty we take a verbatim record of the response.

- Scoring:*
1. Number of details.
 - (a) Authentic.
 - (b) Imagined—details added.
 - (c) Erroneous—details misinterpreted.
 2. Verbal Accuracy.
 - (a) Complete.
 - (b) Partial.
 - (c) No attempt at verbal accuracy.
 3. Logical Sequence.
 - (a) Apparent appreciation of logical sequence.
 - (b) Recital of heterogeneous details.

The record on Case 574 is:

"If a sailor is shipwrecked on some island he should first look for water to drink, next find some place to sleep where wild animals can't get at him and later look for food to eat, but he must watch out not to eat poison berries or things which would poison him. Next look for people and put up a flag that shall stop all ships that go by the island."

1. (a) 10
(b) 0
(c) 1
2. (a) .
(b) +
(c)
3. (a) Yes.
(b)

TEST XIV. INSTRUCTION BOX

We have long felt the need of a test which would specifically bring out the capacity which a subject might or might not have for following instructions. Sometimes such information has seemed very desirable in connection with the necessity for estimating the subject's probable capacity for holding a position. Such a test is a distinct step towards vocational diagnosis, often a most desirable part of psychopathic work in connection with the court. Of course, others of our tests bring out to some smaller extent the power to understand and carry out directions which are given, but at the instigation of Professor Jastrow, we have recently decided to make a test especially directed to this point.

The finished box is very slightly modified from the ingenious original plan designed by Mr. Joseph W. Hayes. In order to increase, when necessary, the difficulty of the test we have added the combination lock.

The make-up of the box can be very readily understood from the following description with reference to the illustrations, Figs. 17 and 18. Its dimensions are about 6 x 5½ x 3½ inches and it may, of course, be constructed of any suitable wood. Fig. 17 represents the exterior of the finished box, with one side painted white and a white mark on the 3 x 2½ inch door plainly to designate the stopping place for the numbers on the combination dial. Fig. 18 represents an inside view of the front cover of the box purposely taken before the lock was put on, in order to show more clearly the mechanism. The other sides and the bottom of the box are perfectly plain with the exception that there are small notches through which the handles project, these latter being on a lower level than the cover itself when it is screwed down in place. The handles and arms are all of wood except the small metal bar. The door opens inward and is held shut by a wooden latch, which can be turned out of the way by means of a knob on the front of the box. This latch is however held in position by a small metal bar swinging on a pivot and having its free end braced against the latch. This bar is in its turn held braced

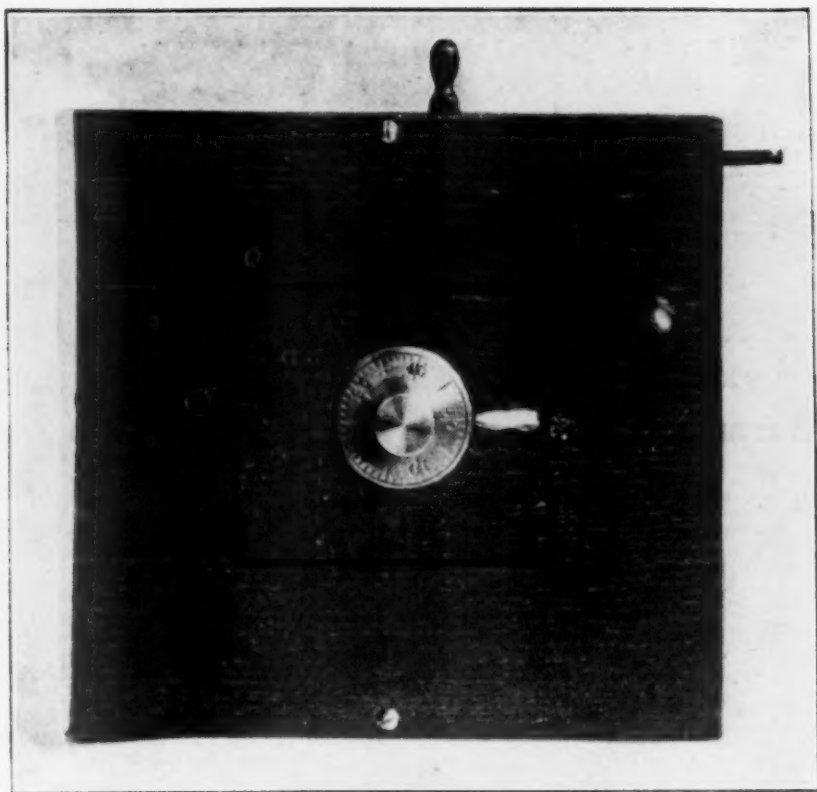


FIG. 17

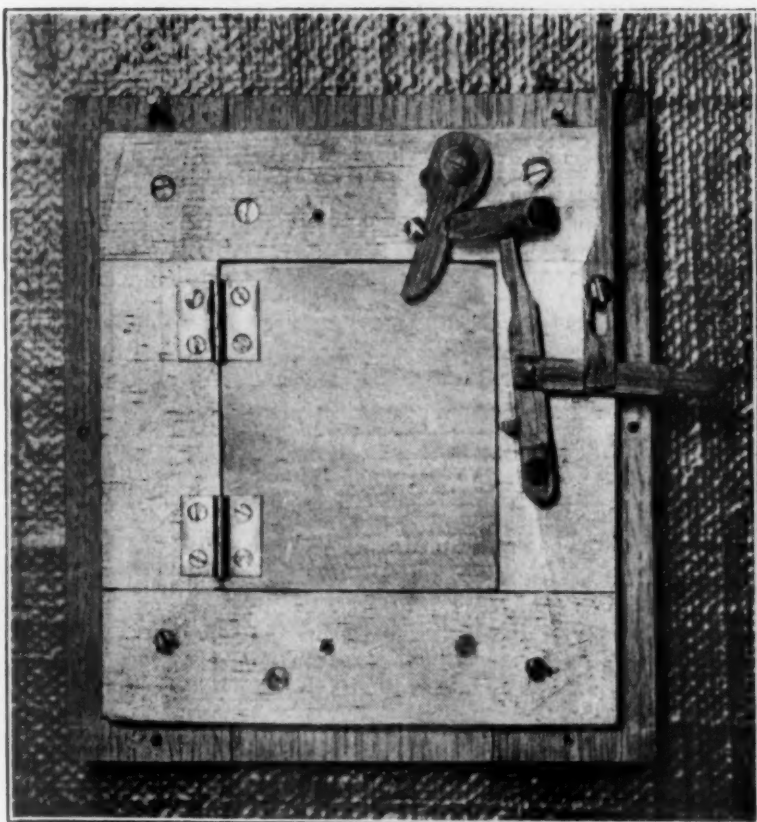


FIG. 18

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by means of the cross-bar of a T-shaped catch. The handle of this latter contrivance is held firm by means of a second handle running perpendicular to the first and fitting into a notch in its surface. It is necessary in order to open the door to make the following steps in the following order. The above mentioned second handle (projecting outside of the box), must first be pulled out as far as it will go, thus freeing the other handle, (also protruding from the box), which can now in its turn be pulled out, releasing thus the pressure of the cross-piece upon the metal bar. If the box is now turned on one end (which is painted white on the outside), this bar will swing down by its own weight, freeing the latch which can now be turned out of the way of the door by means of the knob outside. This door will now be free to open except for the bolt on the combination lock. The combination itself can be set to any desired figures. We have found it necessary to avoid too great difficulty and have adjusted the two tumbler lock so as to have the numbers in such simple relation that it is not required to make turns of the dial past a specified number. By taking the tumblers apart we were able to adjust the lock so that it is only necessary, for instance, to turn to the right to 50, then to the left to 49 and then to the right till the bolt pulls back. The reader will understand that Fig. 18 shows the inside of the box without the combination lock, which when in place takes up considerable room on the door. The lock is one of the smallest and simplest made by the Yale Lock Company.

The method of procedure is simple. The child is told that this is a box which can be easily opened, if he follows out exactly what you tell him. We present it to him in the position shown in Fig. 17 and then by word and gesture pointing to the given parts so that there can be no lack of understanding, we specify slowly each step. For instance, one may say, "First you pull out the handle on this side, so, then you pull out this one on top, then you turn the box up on the white side, like this, then you push this knob as far as it will go over in this direction and then you turn the dial to the right in this way, so that the number 50 comes exactly to this white mark.

Then turn it to the left till you come to exactly 49 and then turn to the right again until you hear the bolt pull back. Then you can push the door open."

It will be found a point of practical common sense, if the subject fails at the first trial, to allow him to make a second attempt, or even a third or fourth, the investigator repeating the directions, if he is not able to correct his own errors. The combination of instructions by word of mouth and by manual demonstration is much the same as the subject would have offered to him in learning office work, or to use a machine, or in many other forms of employment. The test never fails to evoke interest. We know it is not too difficult for bright children, but if necessary the combination lock need not be set and then the door can be opened at the end of four sequential events. The performance of the test is singularly independent of the language factor, which is such a deterrent in the examination of children in our cosmopolitan cities. As an example, it may be stated that a Greek boy, 15 years old, who has only been one year in this country, and who has very poor command of English, successfully carried through all the steps in 45 seconds.

Scoring: We have not had this test long enough to be able to specify all the types of error that may be made, but scoring is obviously a matter of registration of successes and failures of each step enumerated serially, plus the time involved. For instance, one subject may do the whole thing successfully in 45 seconds, another may do only the first three steps correctly and another may succeed in doing the first four steps correctly and then blunder for a time with the combination lock until he is able to correct his own errors.

Record of Case 574 is:

Time 45". Every step carefully, quickly and correctly done.

TEST XV. ASSOCIATION OF VERBAL OPPOSITES—ANTONYMS

This is a well known test. The particular list of words we use is slightly modified from one of Thorndike's lists, and seems well suited to our purpose, some words being more difficult than others.

good	loud	dead	war
outside	black	rich	empty
quick	light	sick	many
tall	happy	glad	above
big	cheap	thin	friend

With stop watch in hand, the investigator must make quite plain, with the help of a few trial words, just what is expected in the way of answers, e.g., "When I say a word you must tell me just as quickly as you can the word that means the other thing from it, the opposite to it. Now if I say hot, what would you say?" After evidence that the test is comprehended the given list of words is gone through with at once and rapidly. In considering the results for estimation of the individual, one must take into account any foreign language factor and the amount and kind of schooling received. These are of obvious importance and may count for as much as native ability. On account of the several environmental factors which tend to beget poor results in many cases, it has seemed to us that positive findings in the way of rapidity and accuracy were more often of importance than negative ones.

We have found many twelve year old children who give correct opposites in the average time of from one and a half to three and a half seconds and who frequently get through the list with not more than one failure and one or two errors,—sometimes indeed, the score in these respects being perfect.

- Scoring:*
1. Average time of words given correctly.
 2. Number of uncorrected errors.
 3. Number of failures—longer than 10 seconds.
 4. Failure due to lack of knowledge, rather than slowness of association time.
 5. Foreign language a factor.

The record of Case 574 is;

I	I	I	I
$1\frac{2}{5}$	$\frac{4}{8}$	$1\frac{1}{8}$	5
$1\frac{4}{8}$	$\frac{4}{8}$	I	2
7	$1\frac{2}{8}$	I	I
I	$1\frac{3}{8}$	I	2

—
34

1. 1'7"
2. 0
3. 0
4. No
5. No

TEST XVI. MOTOR COÖRDINATION TEST

The method we use in this is one suggested to us by Professor Whipple. The test is intended to give some estimate of the motor coördinative power both for accuracy and rapidity. Of course, as associated elements, there always comes in the power of attention and the general mental factors which enter into almost any test. A printed rectangular form is used, divided into 150 half inch squares as shown in Fig. 19. (Black lines on white paper are used.) The subject is instructed to rest his arm on the table and hold the pencil straight up and down or nearly so, thus placing himself in the most favorable position. He is shown how to tap once in each square, beginning at the upper left hand corner and running along the line that has ten squares in it and reversing direction upon coming to the end of the line, on account of the time saving element. He is then told never to touch a line or miss a square. It is emphasized that this is a rapidity test. One must be careful to state that no effort need be made to leave a pencil mark in a square—a mere tap is sufficient. Start is made at the signal, 'Go', and the signal to end is the word, 'Stop', given sharply at the end of thirty seconds. The test is repeated immediately for comparative purposes, using the other end of the rectangle. Errors can be counted as the test is being made.

Perhaps more lack of willingness to do their best is shown here than in any other test, but after all, that factor with the class of young people we examine has very rarely to be contended with. Lack of control from sheer nervousness is sometimes encountered and often curious irregularities are

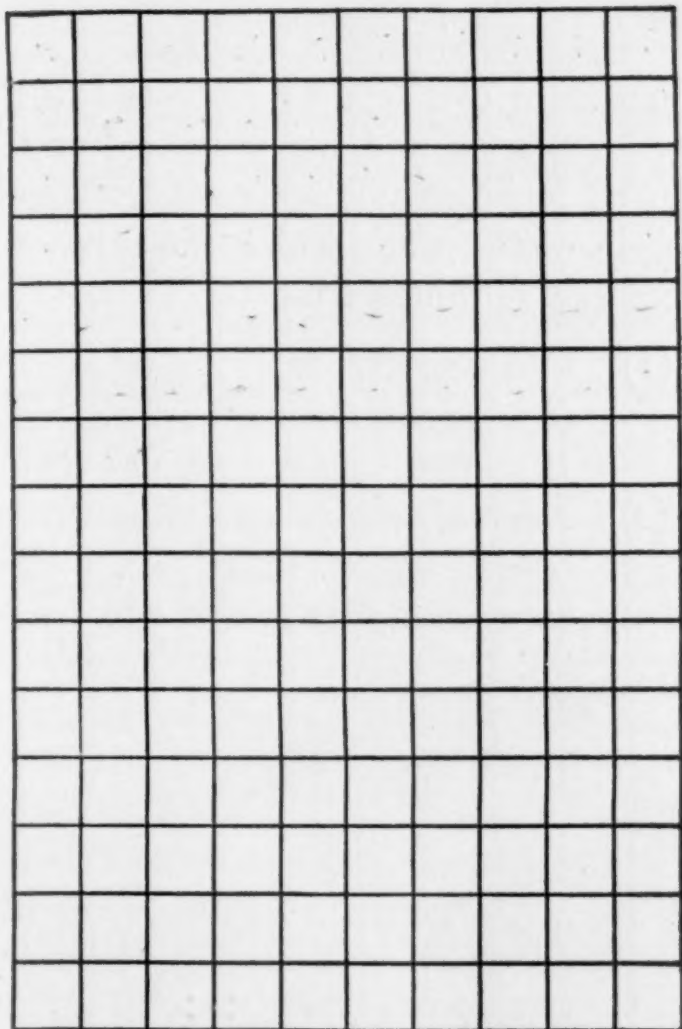


FIG. 19

obtained from the mentally unbalanced. Our 12 year olds frequently do from 65 to 75 in 30 seconds, with 0 to 4 errors.

- Scoring;*
1. Number of squares tapped in 30 seconds on each of two trials.
 2. Number of errors in each trial (including skipping a square, touching a line, or making more than one dot in a single square).

Record of Case 574 is;

- I. (1) 86
 (2) 92
2. (1) 0
 (2) 0

TEST XVII. WRITING

For the purpose of this test we ask the subject to write a short standard sentence and his name. For estimating, it seems wise to us to have average samples which have been written by pupils of the grade which the subject has reached. These will be easily obtained from teachers.

- Scoring:*
- (1) Can't write.
 - (a) Insufficient schooling.
 - (b) Ordinarily sufficient schooling.
 - (2) Normal, poor, or good for grade. (Recorded by N., P., or G.).
 - (3) Slow or fast (Recorded by S. or F.).

Record of Case 574 is;

- I. -
2. N.
3. F.

TEST XVIII. ARITHMETIC

The test to be assigned in number work may be based on the work of the grade in which the subject last was.

- Scoring:*
- (1) Knowledge of method. (Recorded by + or -.)
 - (2) Accuracy. (Recorded by + or -)
 - (3) Speed. (Recorded by + or -)

It may be possible later to amplify these scores by a study of the types of errors which are made.

Record of Case 574 is;

- (1) Partial
- (2) +
- (3) +

TEST XIX. READING

For the purposes of this test a passage should be selected which is suited in difficulty to the grade which the child has reached in school. Such passages may be readily obtained from teachers.

- Scoring:* (1) Can't read.
- (a) Foreign language a factor.
 - (b) Insufficient schooling.
 - (c) Ordinarily sufficient schooling.
- (2) Reads monosyllables only.
- (3) Fails on longer words.
- (4) Normally rapid and well for grade.
- (5) Noticeably fluent and expressive.

Record of Case 574 is;

- 1. —
- 2. —
- 3. —
- 4. Yes, plus.
- 5. —

TEST XX. CHECKERS

A test which may gauge the subject's powers of foresight is undoubtedly of value for our work. Indeed the whole possible relationship of foresightedness to moral behavior is most interesting. Fortunately in the game of checkers we have an easy test which may show some of the mental quality mentioned. However, it is only fair to apply the test with those subjects who know the game and who have played it sufficiently to be thoroughly familiar with it. It seems fairly clear that under these circumstances the results obtained, at least when very good or when very bad, must be of considerable significance for estimation of the sort of foresightedness which the game calls for. Unless one knows certainly that the subject has had good instruction and plenty of practice, negative results should not count for much. We find quite a few youngsters, especially from institutions, who have

played a good deal and once in a while it is possible to get hold of even a 12 year old boy who plays a distinctly good game.

Scoring: 1. Misses more than three advantageous chances to take men.

2. Careful, but not noticeably foresighted game.
3. Foresighted game.

Record for Case 574 is:

Said he had played much.

1. Yes.
2. —
3. —

TEST XXI. REACTIONS TO MORAL QUESTIONS

The use of this test is altogether due to the suggestion of Professor F. C. Sharp, who has used the same method and indeed the same questions extensively in a research of his own.

This is an interesting test from several standpoints. In the first place, with it one can gauge somewhat the powers of intellectual comprehension of a moral situation as expressed in language. Where an opinion is expressed clearly and definitely about the nature of the action in the story, or where there is maintained a strong idea about what should be done in like circumstances, then one may obtain some workings of the individual's consciousness upon ethical lines.

The test needs almost no introduction. We say, "I am going to tell you a story and you tell me what you think about it." Then the problem is at once narrated, if necessary, in the vernacular of the individual. Such explanation as may be needful for the correct understanding of the story is always given if required, but there is little trouble about this matter when the gist of the problem is outlined in something like the straight-forward statement made by Sharp. Naturally, of course, one has, for the younger subjects, to make the statement somewhat more personal and elaborate than given in the

mere outline. For instance, in the second problem, we find it more efficacious to say, "What would you have done if you had been captain of the village?" A short amount of cross examination we have often found necessary in order to find out the child's real opinion and also to ascertain if he would change this, and to see if he possesses realization of the complexities the situation presents. It is usually easy to record the answers verbatim or as memoranda.

Professor Sharp's concise statement of the problems is something as follows:

(1) In a Russian city last year there lived a man who could get no work. He had for a neighbor a sick widow with two little children, who were starving. The poor man took some bread that did not belong to him from a baker's shop, because he could get it in no other way and gave it to the widow and her children. Did he do right or wrong?

(2) A settlement was once besieged by a large body of Indians because the chief thought that one of the white men had done him an injury, though he really had not done so. The chief sent word to the captain of the village that if the man was given up to him he would go away, but if not he would burn the village and kill the people. The captain and the people knew that if the Indians attacked them they would be very likely to capture the settlement and, at least, would kill a good many. They also knew that their fellow citizen was innocent and that to give him up meant torture and death for him.

What was the right thing for the captain of the village to do and why?

What would you have done if you had been captain?

We have long since concluded that for our purposes, one of the best points connected with this test is that it offers a good opportunity for estimation of the subject's power of intellectual comprehension. Beyond this, we have found in many cases the answers given apparently mean very little with regard to the subject's own moral nature. Certainly we would hesitate much to draw therefrom inferences about

the possibilities of his conduct. But occasionally we have received such striking reactions that we have felt we had gained a considerable insight into the character of the individual; for instance, if he steadily dwells upon the necessity for bravery or for self-sacrifice in answer to the second problem. We must then form quite a different impression about his moral make-up than if his statement expressly stands for selfishness. Expressions such as "Take care of yourself every time, that's what I say," "Get out of it yourself, if you can, and let the other fellows look out for themselves" mean something quite different from, "It's a captain's duty to take care of his people. If that man was a very valuable man, the captain should go out and offer himself to take the man's place." Then there is a type of mind, we discover, which will venture an opinion wavering with every little breath of suggestion from us. That seems significant in contradistinction to the sturdiness of others who maintain steadily their first point of view.

The idea has been offered us that the first question might contain a thought which would be harmful to children, but we concur in the opinion expressed by Binet that children are by no means as susceptible to the influence of little stories of morbidity and human peculiarities as people generally believe. We have been interested time and again in noting the excessive reaction against the action of the poor man who steals to give to starving children by the very youngsters who are themselves chronic little thieves. However, on the whole, the first problem seems decidedly the less valuable and we frequently omit it.

Scoring; So far, we conceive the best points to score from the investigator's full memoranda are the following:

1. Apparently a more or less haphazard reply given at first, followed by
 - (a) An unthinking contradiction in response to your suggestions.
 - (b) A childish repetition of his original statement without considering your arguments.
2. Apparent comprehension of the moral situation.

Record of Case 574 is:

- I. Done wrong cause he stole. Done right if he stole for starving people. He could have asked for it. Yes, think he did wrong. (Would you have done wrong then if in his place?) I suppose so. (Slow. Shows suspicion in answering this.)
- II. No, I'd have fought—as long as the man hadn't done wrong. Even if many were killed and village burned still will be better than to give up innocent man. (Persists in this.)
- I. 1. (a) Yes.
(b) No.
2. No.
- II. 1. No.
2. Yes. Decidedly good comprehension.

TEST XXII. INFORMATION

The following list of questions to be asked has been gotten out not only for the purpose of eliciting the actual information possessed by the individual, but also in order to get at what his opportunities have been in general environment and in school life. Through this inquiry one can readily get some indication of the amusements, occupations and aspirations of the subject. (Perhaps it is hardly necessary to say that when special points of character or mental peculiarity are involved, a very much more extensive inquiry about motives, and interests and opportunities is always instituted by us.) Questions may be asked and answers filled out to any extent deemed advisable, but for our purposes the following list has been made up with the help of experienced teachers and after much consideration of both the healthy and unhealthy interests fostered by the every-day, city life of young people. The grouping and the purpose of the questions is apparent to the reader. The questions are verbally presented and the answers may be rapidly filled in as memoranda by the investigator. Under this procedure the whole list takes up only a short time.

Read books?	What makes light of moon?
What ones?	Flour made from?
From library?	Mortar made from?
How many at home?	Where do coal, oranges, cattle etc. come from?
Read newspapers? Which?	What do you expect to be when grown up?
What parts?	What do you want to be?
What has interested you lately?	Jobs easiest? Most dangerous?
Ask about recent murder or burglary.	Father belong to trade union?
Ask about recent disaster, etc.	What do you think of them?
Who is President U. S.?	Play what out-door games?
President before him?	Cards? What games?
First President?	Have you tools?
What celebration is 4th of July?	What things ever made?
Abraham Lincoln? Who? When?	Pet animals?
What lake by Chicago?	Collections? Car transfers, buttons, pictures, stones, shells, stamps, etc.
Five Great Lakes?	Dolls?
Largest city in America?	Cooking? What?
Capitol—where President lives?	Fancy work?
Jesse James? Who? Where hear of him?	Sewing? Make own clothes?
What does cow-boy do?	Athletics? Where? What? How good?
Best base-ball team last year?	Parties? What? With whom?
Champion prize fighter?	Theatres? With whom?
Champion wrestler?	Nickel shows often? With whom?
Been to many plays?	Games at home?
Best one you ever saw?	Classes; singing etc?
What is steam? How works an engine?	Music? Instruction?
Electricity? What does it do?	
What heart beats for?	

TENTATIVE CLASSIFICATION.

We have had surprisingly little trouble with the classification of cases in the scale of mental ability as given below. Perhaps that is because no *a priori* standpoint was taken and divisions were not forced. We followed the scheme of waiting till about 250 cases had been seen and then these were sorted into the places into which they seemed themselves to fall. This system quickly led to the classification which, with a little more exact definition and slight modifications, has proven well its practicability. It is only rarely that we feel

unable to decide between two classes in the following schedule, although we still conceive it to be entirely tentative.

(a) Considerably above ordinary in ability and information—the latter estimated with reference to age and social advantages.

(b) Ordinary in ability and information—the latter estimated with reference to age and social advantages.

(c) Native ability fair and formal educational advantages fair or good, but very poorly informed.

(d) Native ability fair and formal educational advantages fair or good.

(e) Native ability distinctly good, but formal educational advantages poor.

(f) Native ability fair and formal educational advantages poor.

(g) Native ability poor and formal educational advantages poor.

(h) Native ability poor and formal educational advantages good or fair.

(i) Dull from known physical causes, including epilepsy.

(j) Subnormal mentality—considerably more educability than the feeble-minded.

(k) Feeble-minded, (Moron).

(l) Imbecile.

(m) Psychoses.

(Estimation 'formal educational advantages poor' includes no implication of cause, it may be due to chronic truancy or to faulty environment.)

Over and beyond this general classification there is certainly often much else that may usefully be said about the subject from a psychological standpoint. During the course of work with him other points of inestimable value in diagnosis may be discovered. Adventitiously we may find individuals markedly lacking in general powers of attention, emotionally disturbed by special circumstances, wanting in normal interests of their age and sex, tremendously defective in veracity and so on. Then, on the positive side, we have found instances with important unsuspected abilities

for art, mechanics or language, or with highly developed standards of bravery, honor and even honesty—any of which points may well seem determinative for prognosis, if the individual can be placed under favorable conditions. Some discovery of aptitude or inaptitude, such as constructive ability or deficiency, is most valuable from the standpoint of vocational diagnosis which one is often called on to make. As an instance of what effort may be wasted if the case is not studied before treatment, the following is instructive; we lately examined a boy who had much difficulty in manipulating our constructive tests and who showed no interest in any way in mechanical contrivances. This notwithstanding the fact that he had been two years at the state manual training school. That institution had given him up as a bad job, after he had run away some four or five times, out of sheer lack of interest in the special opportunities presented to him. Now if he had been tested before being assigned to this school, the outcome might have been foreseen, so obviously unadapted was he to the type of occupation forced on him. A striking proof of the reverse we have seen in the instance of a 15-year-old orphan boy, notorious for deeds so peculiarly vicious that he was said to be insane at times. He had committed one decidedly serious crime. Badly handicapped by partial deafness from bilateral middle ear disease and extremely refractory to rules of conduct the boy was, even in reformatory institutions, considered a distinctly undesirable person. Finally, while he was being studied by us, it was discovered that he had considerable talent for drawing. Then it followed that with encouragement, instruction and the placing of art materials in his hands, his criminal deeds and 'insane spells' at once dropped away from him like shackles. This opportunity for self expression has given him just the one satisfactory interest in life that he has ever possessed.

It is easy to see that all the psychological findings can not be expressed in terms of any classification. We find it best always to write up in detail special impressions directly after the examination—impressions that may well be modified as the case is followed and further observation is made.

It is, of course, to be clearly understood that where special problems are involved, for instance, in cases of suspected dementia praecox, the above tests are supplemented by others especially adapted.

TABULAR SCORING RECORD

We append herewith a tabular scoring-form. For the practical purpose of comparing results of tests with one another in the same individual or similar tests in different individuals of the same age a businesslike arrangement is essential. To Mr. W. F. Dummer is due the credit of having developed the following ledger form, which by a system of colored lines makes tabulation and future deciphering particularly easy.

[illegible]

[illegible]

[illegible]